ARCHIVES OF OTOLARYNGOLOGY

VOLUME 24 SEPTEMBER 1936 NUMBER 3

COPYRIGHT, 1936, BY AMERICAN MEDICAL ASSOCIATION

TREATMENT OF ANGIOMA OF THE FACE

FREDERICK A. FIGI, M.D.
ROCHESTER, MINN.

The most effective agents and procedures for the treatment of hemangioma of the face are, in the order of their usefulness, radium, electrocoagulation, excision and injection of sclerosing substances. Ligation of the afferent vessels and various plastic procedures are frequently used to supplement these measures. Application of carbon dioxide snow, electrodesiccation, cautery, introduction of subcutaneous sutures, roentgen therapy, ultraviolet irradiation and application of collodion have a much more limited field of usefulness. While the results obtainable with these forms of treatment vary greatly, choice of therapy is usually determined largely by the experience of the clinician with any one or group of them.

Although adults not infrequently have this type of tumor, the great majority of patients with angioma are children. It is, in fact, the most common tumor of childhood. In most instances it is present at birth, but in many cases it does not become evident for days, or even months. There is little evidence to support the idea that the growth is at times of traumatic origin. Davis and Wilgis [1] expressed the belief that when there is a definite history of trauma, the tumor was not caused by the trauma but was already present and was stimulated by it. This is in keeping with my experience. Angioma is characterized primarily by proliferation of endothelial cells and is entirely distinct in this regard from varicosities and various types of aneurysm which may develop after trauma.

Although both hemangioma and lymphangioma occur about the face, the former is more common and accordingly is of greater clinical importance. It may occur in any organ or tissue of the body, but it usually develops about the head and neck and especially on the face. Females are affected approximately twice as often as males. Removal is therefore most often sought for cosmetic reasons. However, other

---

From the Section on Laryngology, Oral and Plastic Surgery, the Mayo Clinic.

Read before the American Laryngological, Rhinological and Otological Society, Denver, May 18, 1936.

1. Davis, J. S., and Wilgis, H. E.: The Treatment of Hemangiomata by Excision, South. M. J. **27**:283-289 (April) 1934.

indications for eradication are frequently encountered, such as rapid extension of the neoplasm, interference with function, spontaneous or traumatic ulceration of the growth, danger of serious hemorrhage or infection and the possibility of malignant change.

Hemangioma is most commonly classified as (1) capillary or (2) cavernous. Fraser's [2] classification includes a third type, which he designated compact hemangiomas. His explanation of the etiology and his description of the histopathologic characteristics of these types of hemangioma are both interesting and enlightening.

According to him, the origin of capillary hemangioma can be traced to the failure of certain cells or groups of cells in the vascular layer of the embryo to establish contact with the developing vascular network. Such cells proliferate and become vacuolated, as do the others, but in their disjoined state they do not proceed beyond the stage of a mesh of minute, blind channels through which the blood of the general circulation does not pass. The lumens of the blood vessels in a tumor of this type either are empty or contain a few immature or degenerate corpuscular elements. The capillary angioma may grow rapidly and may vary in size, as seen superficially, from a minute speck of looped capillaries to a large flat port wine stain.

The compact hemangioma, Fraser explained, is attributable to intense proliferation of the cells forming the walls of the fine pseudocapillaries. This gives rise to perivascular or endovascular thickening and results in the formation of a solid mass of cells in which the lumens are no longer visible.

The cavernous hemangioma results from the establishment of a connection between the general circulation and the fine channels of a tumor of the capillary type. The capillary tubules become distended; the walls break down further, and pools and channels of normal blood are found in the irregular spaces, which are still lined by endothelium. When the afferent and the efferent vessels of the tumor are large, the tumor at times pulsates. This pulsation may be sufficiently pronounced to be readily visible at a distance of several feet. A palpable thrill is also present in some growths. These features are of considerable importance in determining the type of treatment advisable.

Cases in which a capillary or a cavernous hemangioma spontaneously disappeared have been reported in the literature. In fact, the superficial vascular lesion not infrequently seen on the nape of the neck, below the occipital protuberance or on the center of the forehead of a newborn infant, which is known to the dermatologist as "naevus simplex," usually fades spontaneously. However, the true capillary or cavernous angioma so rarely disappears of itself that there is little justification for

2. Fraser, John: The Haemangioma Group of Endotheliоblastomata, Brit. J. Surg. **7**:335-342, 1919-1920.

delaying treatment. At times the lesion actually progresses at a more rapid rate than can be accounted for by the natural growth of the body. Such progression occasionally results in the involvement of a considerable area of previously normal tissue, and delay in instituting treatment may accordingly be of serious consequence.

At present radium is generally considered the most effective agent for dealing with hemangioma, especially of the face. Among the earliest advocates of radium treatment for angioma were Wickham and Degrais,[3] in France, whose published reports first appeared in 1907. The use of radium spread rapidly, as it yielded results far superior to those obtained with the therapeutic measures employed up to that time. At the Mayo Clinic this form of therapy was used almost exclusively in the treatment of hemangioma from the time of its introduction in 1913 until 1924, when electrocoagulation was first employed. No other agent or procedure used at the clinic has given as satisfactory results in the treatment of angioma in children. However, electrocoagulation has largely supplanted radium therapy in the treatment of cavernous angioma in adults, as such a tumor can usually be shrunken or scarred down more rapidly by electrocoagulation and fewer treatments are required.

Prior to the introduction of radium in the treatment of this type of vascular growth, surgical excision was the therapeutic method of choice, and it is still so considered by a number of able general and plastic surgeons. As a matter of fact, from time to time, especially in adults, one encounters a localized angioma that can be removed most satisfactorily surgically, but cases of such a growth are decidedly in the minority. From personal experience with radium therapy, diathermy and surgical excision in the treatment of this type of neoplasm, it is difficult for me to understand the preference for surgical extirpation, with its greater technical difficulty, increased risk, more prominent scarring and generally less satisfactory cosmetic and functional results.

The argument advanced by those advocating excision of angioma, that removal of the scar is often required after irradiation, electrocoagulation and other forms of therapy whereas it is obviated by primary surgical removal, bears little weight. Extremely active and at times uncontrollable bleeding is encountered in excising a tense, pulsating tumor, and the risks are far greater than with irradiation or electrocoagulation followed by excision of the scar.

It appears that the results of irradiation observed by surgeons favoring the excision of angioma must have been unusually bad, and one cannot help wondering if the treatment was given by an experienced radiologist. As is well known, radium therapy in inexperienced hands can be extremely unsatisfactory in the treatment of this type of tumor just as it can be in that of any other type. Telangiectasia, pigmentation,

3. Wickham and Degrais, quoted by Andrén.[4]

excessive blanching, dense sclerosis and atrophic scarring frequently develop after excessive irradiation and improper screening. Arrested development of the adjacent structures may result from repeated irradiation of a region in early life. Secondary malignant change in areas of radiodermatitis is not uncommon. An experienced radiologist, however, can by careful treatment reduce these ill effects to a minimum, and in a high percentage of cases in which proper treatment is carried out the tumor is made to disappear completely, leaving little or no evidence of its ever having been present (fig. 1).

In the treatment of angioma radium may be administered in several forms: (1) in a surface pack, using distance and screening, (2) in a plaque or in tubes applied directly to the surface of the lesion and (3) in needles or as radon seeds implanted into the tumor. There are certain

Fig. 1.—The photograph at the left shows a child 11 months of age with an extensive and progressive capillary and cavernous hemangioma; that at the right, the result following treatment with radium in the form of surface packs, a plaque and implanted points.

definite indications for each of these types of treatment, although any two or even all of them may be combined to advantage. Moreover, the age at which the patient presents himself for treatment is extremely important in determining the form of radium therapy advisable and in determining the choice between irradiation and some other form of therapy. Radiologists are generally agreed that the earlier in life radium treatment is instituted, the better is likely to be the result. However, observations at Radiumhemmet led Andrén [4] to conclude that there is no difference in the sensitivity of angiomas to radium during the first year of life (fig. 2).

4. Andrén, Gunnar: The Radium Treatment of Haemangiomata, Lymphangiomata and Naevi Pigmentosi: Experiences from "Radiumhemmet," 1909-1924. Acta radiol. **8**:1-45, 1927.

At the clinic, patients in early childhood who have a cavernous angioma on the face measuring several centimeters or more in diameter usually receive treatment with radium packs. The dose ranges from 2,000 to 3,000 milligram hours, and the treatment is repeated at intervals of from three to four months, the number of treatments depending on the response. Similar lesions of the face of adults can as a rule be taken care of more satisfactorily by electrocoagulation or excision, with or without ligation of the efferent and the afferent vessels. In addition, radium needles or small tubes containing small amounts of radium are inserted directly into the tumor, through a short incision in the adjacent normal skin along the skin folds. Usually 10 milligram needles of radium element are used, and from one to six or more are implanted for periods of several hours, depending on the situation and extent of the

Fig. 2.—The photograph at the left shows a diffuse cavernous angioma of the right side of the face, with small capillary areas on the lips; that at the right, the result following treatment with radium packs and a plaque.

growth and whether or not it has been treated previously. This procedure is carried out under strict asepsis, as secondary infection greatly increases the severity of the subsequent reaction. As a rule, the response to implanted radium is most effective, and a single treatment may cause a large angioma to reduce in size to a marked extent or even to disappear completely, with a minimum of surface scarring. When necessary the procedure may be repeated after two or three months (fig. 3).

When a radium plaque is used it contains from 5 to 25 mg. of radium element. The plaque is most effective in the treatment of capillary angioma. Covered with a rubber finger cot, it is kept moving constantly and uniformly over the surface of the angioma for from several minutes to an hour or longer, depending on the size of the lesion, the intensity of the discoloration and whether treatment has been given

previously. Other factors being equal, the plaque containing a smaller amount of radium element used for a long period as a rule produces a more satisfactory cosmetic result than the plaque containing a greater amount of radium element used for a short period.

Electrocoagulation has greatly improved the results of treating cavernous angioma in adults. Often a growth of this type can be eradicated by this method with comparatively little scarring, whereas repeated applications of radium when the patient is mature frequently accomplish little. A special electrode which we devised at the clinic is used. It consists of a rigid steel wire several centimeters in length, sharpened at one end and insulated, except for about 3 mm. at its sharpened end, with vulcanite, duco cement or some other nonconductor of electricity. This is thrust into the deeper portion of the

Fig. 3.—The photograph at the left shows a tense pulsating hemangioma of the left cheek, which was extending in spite of previous ligation of the right external carotid artery and the left internal, external and common carotid arteries, repeated injections (twenty) of sodium morrhuate and radium therapy; that at the right, the result following two treatments with implanted radium points and surface packs.

tumor directly through the overlying skin. The current is then applied, and the desired degree of electrocoagulation is carried out (fig. 4). The chief difficulty is in gaging the intensity and the extent of the coagulating process. Usually a slight change in the color of the tumor over an area adjacent to the electrode from the normal blue or violet-blue to a somewhat lighter shade indicates a sufficient degree of coagulation. However, when a tumor has been treated previously, especially by irradiation, this change is not reliable, and sloughing may follow what has appeared to be only moderately intensive therapy. I know of no criterion that is infallible. The slightest change in color and difference in temperature and consistency of the tissues must be carefully

noted. Proficiency in using electrocoagulation is likely to be attained only through experience with a considerable number of cases. Too extensive coagulation produces sloughing, which may involve a considerable area of the overlying skin and necessitate major plastic repair. Insufficient coagulation, on the other hand, is likely to accomplish little, thereby necessitating an undue number of operative procedures, with the result that the patient may become discouraged and abandon treatment before the desired result is attained.

Frequently it is of decided advantage to precede electrocoagulation by ligation of the afferent and the efferent vessels supplying the tumor. This is especially true when these vessels are large and the tumor has an expansile impulse or palpable thrill, since with the circulation within the mass reduced the coagulating process proceeds more rapidly, and

Fig. 4.—The photograph at the left shows a cavernous hemangioma of the lower lip; that at the right, the result following electrocoagulation and a subsequent plastic operation on the inner surface of the lip.

the degree of coagulation can be more accurately gaged (fig. 5). The skin covering the tumor at times is so thin that it is practically impossible to avoid destroying it as the deeper portion of the tumor is electrocoagulated. In such cases it often is of advantage to introduce the insulated electrode into the growth through the adjacent normal skin. The slight coagulation resulting from the escaping steam about the point where the electrode perforates the skin usually is of no consequence unless the deeper tissues have been excessively heated. As a rule, these points heal without infection or sloughing. Unless there is sloughing, the coagulating process may be repeated in approximately two months. While electrodesiccation is sometimes used in the treatment of capillary angioma of the skin, it is as a rule advisable only for a small, superficial lesion because of the unsightly white scars pro-

duced. These scars often stand out in decided contrast to the surrounding skin, and the cosmetic improvement is questionable. In a wide experience in the treatment of cavernous angioma of the face with electrocoagulation at the clinic during the past eleven years, no serious complications were encountered. Care must of course be exercised when electrocoagulation is employed in an area adjacent to a branch of the facial nerve or near a large blood vessel. However, neither paralysis of the facial nerve nor active secondary bleeding has thus far occurred.

While surgical excision has been supplanted to a great extent by radium therapy and electrocoagulation in the treatment of angioma of the face, in certain cases hemangioma can be dealt with more satis-

Fig. 5.—The photograph at the left shows a tense, pulsating cavernous hemangioma of the nose and upper lip; that at the right, the result following ligation of the afferent vessels, electrocoagulation, radium therapy and a subsequent plastic procedure.

factorily by means of surgical excision. This is especially true in many cases of capillary angioma, particularly in cases of port wine stain which has been treated unsuccessfully with radium (fig. 6). In many instances such a lesion is resistant to radium therapy; yet this treatment is not infrequently persisted in until portions of the area are badly scarred, irregularly pigmented and at times distorted to such an extent that the appearance is much worse than it was originally. Complete excision of the lesion at one operation or in stages, depending on the size and the situation, often gives satisfactory results. Primary closure of the wound, with or without undercutting of the edges, can sometimes be carried out, or the denuded area can be covered with either a shaved or a dissected skin graft.

At the clinic epithelioma has frequently been observed which has developed in the dense scar left by the treatment with radium of a capillary angioma or of a mixed capillary and cavernous angioma. Frequently it has been necessary to remove immediately and widely the malignant area and to delay consideration of the remnant of the angioma until a later date. Excision by cautery or thorough electrocoagulation of the area of activity has usually been carried out.

The injection of a sclerosing substance in the treatment of angioma is generally considered a comparatively recent development. As a matter of fact, Giraldes [5] in 1854 presented before the Surgical Society of Paris a patient in whom he had successfully treated an angioma by the injection of solution of ferric chloride. Later, other sclerosing agents were tried, with more or less indifferent success, until the injec-

Fig. 6.—The photograph at the left shows a capillary angioma (port wine stain) with scarring from previous radium therapy; that at the right, the result following excision and application of a full thickness skin graft.

tion of boiling water was introduced by Wyeth,[6] of New York, in 1902. According to his experience and that of Reder,[7] this measure proved efficacious in a large series of cases. It was not until later, however, after the effectiveness of the injection of a sclerosing substance, especially one of various chemical irritants, in the treatment of varicose veins had been demonstrated, that enthusiasm was aroused over

5. Giraldes, quoted by Light, S. E.: The Injection Treatment of Cavernous Hemangiomas: Report of a Case and Historical Review, Arch. Dermat. & Syph. **24**:992-998 (Dec.) 1931.

6. Wyeth, quoted by Reder, Francis: Hemangioma and Lymphangioma: Their Response to the Injection of Boiling Water, M. Rec. **98**:519-521 (Sept. 25) 1920.

7. Reder, Francis: Remarks on the Treatment of Cavernous and Plexiform Angioma, Illinois M. J. **32**:387-393, 1917.

this method of dealing with angioma. It is becoming increasingly popular and it may in the course of time replace many of the therapeutic measures already discussed in the treatment of angioma of the cavernous type. In view of the marked effect of radium on the endothelial cells, however, it seems likely that radium therapy will hold its place in this field.

While injection treatment is said to be more effective in dealing with cavernous angioma, it has also been used in the treatment of capillary angioma. Among the various sclerosing agents employed, aside from boiling water and ferric chloride are quinine, alcohol, phenol, mercury bichloride, arsphenamine, potassium iodide, sodium chloride, dextrose, quinine and urea, sodium morrhuate, sodium iodide, sodium salicylate and sodium citrate. According to the reports of most authors, the injections are made directly into or about the vessels making up the angioma, at intervals of from one to several weeks, depending on the amount of reaction produced. Injecting the solution directly into the lumens of the vessels appears to be more effective in scarring down the tumor and produces less discomfort. Reder stated that he had repeatedly injected boiling water into an angioma without employing an anesthetic and was astonished that the pain was not more severe. During the injection, peripheral pressure is applied to lessen the tendency of the coagulant to diffuse beyond the angioma and also to guard against thrombosis and embolism. In certain situations, as on the face, it seems impossible to apply pressure effectively, since a considerable portion of the blood enters and leaves the tumor through vessels situated deep below the surface.

One of the outstanding advantages cited for injection treatment is the fact that the patient is ambulatory. However, with other therapeutic methods, aside from excision or electrocoagulation of an extensive angioma, only brief hospitalization is required. The possible complications are sloughing, with subsequent scarring, infection, embolism and thrombophlebitis. While these untoward results have rarely been reported by experienced operators, pulmonary emboli have occurred after the injection of hot water or some other sclerosing solution. A number of fatalities resulted from the early use of ferric chloride. The injection treatment of varicose veins has been used for a number of years at the clinic, with highly satisfactory results, but except for hot water, sclerosing agents have not been employed in the treatment of angioma. No complications were encountered in the small group of cases in which injections of hot water were made use of, but the other methods of treatment, namely, irradiation, electrocoagulation and excision, are more satisfactory from our standpoint since fewer and less frequent treatments are required.

SUMMARY

Radium is the most effective agent in the treatment of hemangioma of the face in a child. Electrocoagulation is the treatment of choice in many instances of cavernous hemangioma in an adult.

An angioma of the face previously treated unsuccessfully with irradiation is best excised, the wound then being closed primarily or covered with a skin graft.

The injection of a sclerosing substance is becoming increasingly popular in the treatment of angiomas, and in the course of time this method will probably supplant some of the older methods of therapy.

SAFETY-PIN IN THE ESOPHAGUS

LOUIS H. CLERF, M.D.
PHILADELPHIA

The safety-pin, commonly present as a foreign body, is more often found in the food passages than elsewhere and practically always is open. In my personal experience, of over 825 foreign bodies removed endoscopically, 77 were safety-pins. In 59 cases the pin was removed from the food passages; in the remaining 18 it had lodged in the air passages. The removal of an open pin with the point directed upward, a type of foreign body usually found in an infant or child, constitutes a problem that is often difficult of solution and fraught with hazardous possibilities. Of the 59 foreign bodies removed endoscopically from the food passages, 1 lodged in the sigmoid flexure, where it remained for sixty-four days before removal by peranal endoscopy. This case is not included in the following analysis.

ANALYSIS OF CASES AND COMMENT

Age.—All but 3 of the patients were children under 6 years of age. Forty-four (76 per cent) were aged 1 year or less; 3 were infants aged 20, 21 and 35 days, respectively. Of the 3 adults, 2 swallowed a safety-pin with suicidal intent. The overwhelming proportion of children affords additional evidence that carelessness is the most important factor in this form of accident and that routine closure of safety pins would aid greatly in prophylaxis.

Location of the Foreign Body.—The pin was found in the following locations: hypopharynx, 9 cases; cervical portion of the esophagus, 22; thoracic portion of the esophagus, 23, and stomach, 4. The pin was found open in all cases. In 51 instances the point and keeper were uppermost; in 7, the spring was uppermost, with the point and keeper directed downward. In 6 of the latter group the pin was lodged either in the hypopharynx or in the cervical portion of the esophagus. In the remaining case it was found in the thoracic portion of the esophagus. This case is of interest.

A child aged 4 months swallowed an open safety-pin which had been dropped accidentally from the mother's hand into the child's open mouth. An attempt was made to remove it by digital manipulation. When the patient was examined

---

From the Bronchoscopic Clinic, Jefferson Hospital.
Read before the American Laryngological, Rhinological and Otological Society, Denver, May 20, 1936.

six days later at the bronchoscopic clinic, the open safety-pin was found in the esophagus with the point and keeper directed downward. The spring was at the level of the bifurcation of the trachea. It was difficult to explain how the pin could have reached this level with the point advancing. It is probable that the pin was swallowed and later was vomited into the esophagus, where it lodged.

Symptoms.—Disturbances in swallowing, with or without pain or knowledge of a safety-pin having been swallowed, were fairly constant observations. In 35 cases a roentgen diagnosis was made within twenty-four hours after the object had been swallowed. In all cases but 1, a diagnosis was made and the foreign body was removed within seven days after the time of the accident. In the exception noted the pin remained in the hypopharynx of a child aged 4 months, for one month. Although there was an attack of choking and bloody secretions had been observed in the child's mouth while she was lying in her go-cart, and a safety-pin was missing, the case was not investigated until wheezing and crowing respiration developed. A roentgen study revealed an open safety-pin, point uppermost, with the spring below the cricopharyngeus muscle.

Diagnosis.—Complete roentgen examination constitutes the only means of diagnosis. While a roentgenoscopic study may be sufficient to permit a diagnosis, additional information must be secured before endoscopic removal is contemplated. Films should be made in the postero-anterior and in the lateral position. If the pin does not lie with its greatest diameter in the coronal plane, additional films should be made to demonstrate the maximum spread of the pin. The need for these additional studies can be ascertained at the preliminary roentgenoscopic examination. A duplicate of the pin should then be secured by matching with the roentgenogram.

Treatment.—The method of removal depends on a number of factors. Among these are the age of the patient, the location and position of the pin, its size, shape and spread, the stiffness of the spring, the presence of a spring-clamp and deformity of the safety-pin. Previous attempts at removal might also be considered as a factor. Jackson described sixteen fundamental methods of dealing with a safety-pin lodged point upward. He indicated that a few minor modifications of these could be added. One should be familiar with these methods and have at hand adequate equipment in working order to carry them into effect. I have not practiced breaking, cutting or dismembering the pin. The methods commonly employed in cases in which the point was uppermost were dangling, closing, endogastric version and straightening of the pin after it had been carried into the stomach.

The dangling method is particularly applicable to a pin located in the hypopharynx or the cervical portion of the esophagus. When the point has descended to the level of the suprasternal notch, dangling should not

be employed unless the pin is extremely small. If the keeper is grasped with rotation forceps and if it is not brought into contact with the end of the endoscopic tube, so that it may dangle freely, the point will not be likely to puncture unless the length of the pin is greater than the transverse diameter of the esophagus. The keeper practically always is found readily and can be grasped without difficulty. The likelihood of losing the pin or lodging it in the thoracic portion of the esophagus during one's manipulations therefore is lessened. The dangling method was employed in 22 of the cases of foreign body in the hypopharynx or cervical portion of the esophagus. Postoperative complications were not observed in any of these cases.

Sheathing of the point shaft by means of the Tucker forceps or the Mosher trapdoor esophagoscope is readily done on the practice board manikin. In the living patient the oblique position of the point shaft, the keeper shaft practically always being in the axis of the esophagus, makes this method difficult of accomplishment.

A pin with the point upward in the thoracic portion of the esophagus was either closed or carried into the stomach for version or straightening. The modified Arrowsmith closer is ideal when one is working on the manikin. The difficulties in its employment on the living patient lie in the fact that it cannot be applied to the safety-pin without double-planed roentgenoscopic guidance and that accurate placement is necessary to secure closure of the pin. If the pin is small it is readily dislodged, and one may find it necessary to resort to some other method before the foreign body reaches the stomach. It is necessary to be certain beforehand that the pin is not deformed if closure is to be effectively carried out. Closure was employed successfully in 10 cases. In 4 others it was attempted but the pin was dislodged and it became necessary to resort to another method. In 3 of these cases the pin was removed by endogastric version; in the remaining case, it entered the stomach and was removed by means of the gastroscope.

Endogastric version is a satisfactory method of removal, particularly if the pin is in the lower part of the thoracic portion of the esophagus. It cannot be effectively done if there is a clamp on the spring of the pin. This information should be secured by roentgen study. While roentgenoscopic assistance is essential, the esophagoscopist should work with his eye at the end of the tube during the application of the ring rotation forceps on the spring and also during the procedure of carrying the pin, forceps and tube into the stomach. When the stomach is entered the roentgenologist can advise regarding the manipulations necessary to secure version. This method was used in 11 cases.

In the case of a small pin which does not lend itself to closure or to certain other methods of removal it may be desirable to grasp the keeper and straighten the pin over the end of the tube, provided it has been

previously demonstrated by practice with a duplicate pin that the keeper can be brought into the end of the esophagoscope. While straightening such a pin over the end of the tube is a safe procedure, since the point trails in such a manipulation, I have found it desirable to carry a foreign body of this type into the stomach and straighten it over the end of the tube in that location. This was done in 3 cases.

In 7 instances the pin was found spring uppermost. The problem in these cases was relatively simple. Care should be exercised that one does not override the foreign body. Grasping the spring with a rotation forceps and withdrawing the open pin with trailing point and the tube simultaneously or drawing the pin into the end of the tube is the method of choice.

A pin in the stomach usually is grasped by the spring extremity and brought into the end of the tube. This procedure was resorted to in 4 instances.

Roentgenoscopic Assistance.—The inability of the endoscopist to be certain at all times concerning the position of the pin and the relation of the forceps to the part to be grasped renders roentgenoscopic assistance invaluable. I consider it an indispensable aid in all cases of safety-pin in the thoracic portion of the esophagus or in the stomach. The position of the assistant holding the patient's head interferes with its employment in cases in which the pin is in the cervical portion of the esophagus. The importance of the double-planed roentgenoscope need not be emphasized here. One should never contemplate using the modified Arrowsmith closer without its aid, since the jaws of the open forceps cannot be visualized through the tube and their accurate placement is difficult even under the most favorable conditions.

Perforation of the Esophagus.—The occurrence of perforation of the esophagus is a serious accident because of the danger of mediastinitis. Cases have been met with in which this complication developed without previous instrumentation. Such an occurrence was noted in an infant, 3 weeks of age, who was brought to the bronchoscopic clinic with a history of having swallowed a small open safety-pin. There were attempts at digital removal. A roentgen study revealed the pin in the midthoracic portion of the esophagus. On admission, about twenty-four hours after the accident, the child was practically moribund, and it died within an hour. No attempt was made to remove the pin. Postmortem examination revealed a perforation in the esophageal wall produced by the point of the pin, with mediastinitis.

Injury to the heart or to the great vessels by perforation of the point of the pin without development of mediastinitis may occur, as in the following case:

A child aged 2 years swallowed a large safety-pin. An attempt had been made to remove it, but this was unsuccessful, and the patient was admitted to the broncho-

scopic clinic. A roentgen study made late on the same day revealed an open safety-pin in the lower end of the esophagus, with the point directed anteriorly and to the left. Esophagoscopy with roentgenoscopic assistance was contemplated the following morning. During the night the child suddenly died. The cause of death was not apparent. At postmortem examination it was found that the point of the pin had perforated the esophagus, the pericardium and the posterior wall of the left ventricle. The pericardial sac was filled with blood clots.

It is possible that perforation of the esophagus may occur without fatal or even serious developments. One must, of course, depend on roentgen evidence to support the belief that there was perforation. The following cases are cited:

A child 2½ year old swallowed a safety-pin twenty-four hours before admission to the bronchoscopic clinic. The roentgenologist employed a barium sulfate mixture to outline the esophageal wall with relation to the pin. To his surprise it was found that about three fourths of the point shaft projected beyond the left wall of the esophagus as outlined by the barium mixture (fig. 1). The pin appeared to

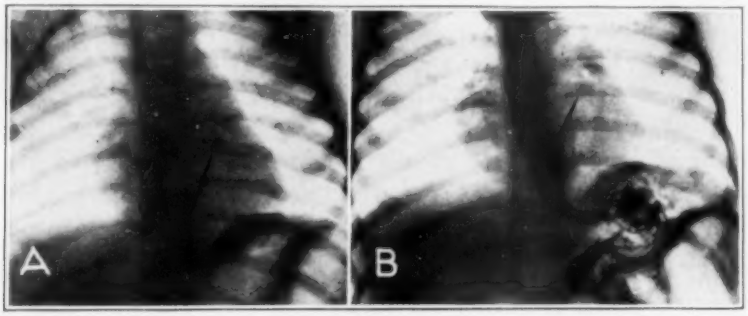


Fig. 1.—Roentgenogram showing a wide-open safety-pin in the lower part of the thoracic portion of the esophagus. On the roentgenogram *(B)* made after a barium mixture had been swallowed and outlined the esophagus, about three fourths of the point shaft of the pin may be observed projecting beyond the left wall of the esophagus. (Films by Dr. R. M. Smith.)

have penetrated the esophageal wall. At esophagoscopy a great portion of the point shaft could not be visualized. Removal of the pin was effected by endogastric version under roentgenoscopic guidance. No complications developed; in fact, the temperautre was normal within twenty-four hours after esophagoscopy.

In a second case, that of a child aged 6½ months, an attempt at removal was carried out before the patient's admission to the bronchoscopic clinic. The roentgenogram made prior to the attempt at removal was not available, and therefore the position of the pin at that time could not be learned. On the patient's admission the safety-pin was found with its greatest axis in the sagittal plane of the body. The spread of the pin was slightly more than 3 cm. (fig. 2). The point was found embedded in the anterior wall of the esophagus. From its position and spread I was convinced that it had perforated the esophageal wall. It was removed by endogastric version with roentgenoscopic aid and without the development of complications or sequelae.

End-Results.—There was a single fatality in the group of 58 cases in which endoscopic removal of a safety-pin was carried out.

A child aged 22 months swallowed an open safety-pin. When she was admitted to the bronchoscopic clinic, four days later, the open pin was observed by roentgen study in the upper part of the thoracic portion of the esophagus, with the point upward and directed toward the right and anteriorly. There had been no previous attempt at removal; it was difficult, therefore, to account for this unusual position (fig. 3). With roentgenoscopic assistance an esophagoscopy was performed. The point of the pin was found embedded in the mucosa. Closure of the pin after

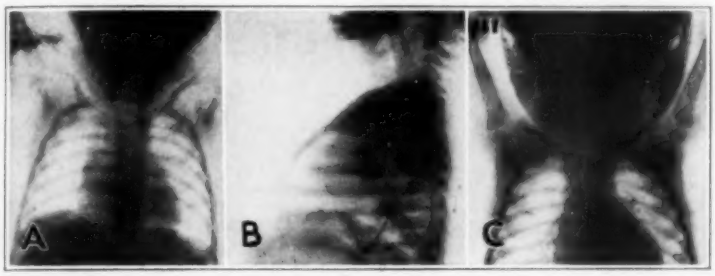


Fig. 2.—Roentgenograms showing a safety-pin in the lower end of the esophagus. In *A* and *B* the pin is shown with its maximum spread in the sagittal plane. The distance between the keeper and the point was slightly more than 3 cm. *C* was taken after removal of the pin. (Films by Dr. W. F. Manges.)

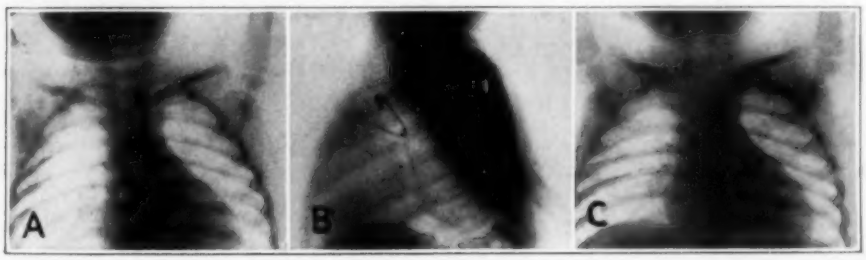


Fig. 3.—*A* and *B*, roentgenograms showing a safety-pin in the upper part of the thoracic portion of the esophagus; *C*, a film taken after removal of the pin. The position of the pin is unusual, particularly in view of the fact that there had been no previous attempt at removal. The pin was dislodged downward, and endogastric version was performed. Death occurred fourteen days later from hemorrhage, the result of perforation of the esophageal wall and the innominate artery by the point of the pin. (Films by Dr. J. T. Farrell, Jr.)

its dislodgment was contemplated. Before the closure could be effected, the pin had descended to the lower end of the esophagus. The spring was then grasped with a rotation forceps, and endogastric version was performed. The patient made a satisfactory recovery and was discharged in the care of the family physician three days later. Fourteen days after esophagoscopy the patient had a large hemorrhage, which was believed to be of gastric origin as the blood was vomited.

He was again admitted to the clinic. Nothing was found to account for the bleeding. A transfusion of 300 cc. of blood was given. Later, additional blood was vomited, and the child died within twelve hours, from the effects of a massive hemorrhage. At autopsy Dr. B. L. Crawford noted a small pouch on the anterior wall of the esophagus which he believed was a diverticulum. The bottom of the sac was eroded and communicated with a slitlike opening of the innominate artery. There was no evidence of mediastinal suppuration. The point undoubtedly had perforated the esophageal wall in close relation to the innominate artery and then injured the vessel wall. It was interesting to note that a culture of the blood made at autopsy, shortly after death, revealed a growth of hemolytic streptococci.

SUMMARY

A group of 58 cases in which a safety-pin was present in the upper food passages is analyzed, and certain statistical data are reviewed. The methods of removal that were employed are enumerated. The end-results in the single fatal case are presented. Perforation of the esophagus is discussed.

BRONCHIAL FOREIGN BODY WITH SIMULTANEOUS UNILATERAL EMPHYSEMA AND COLLAPSE

REPORT OF A CASE

INO KUBO, M.D.

TOKYO, JAPAN

It is generally known that when a bronchus is completely obstructed atelectasis of the lung develops on the involved side. This is evidenced by dark shadows on the roentgenogram. If, however, the bronchus is obstructed by a valvelike object which permits the entrance but not the exit of air, the affected lobe becomes emphysematous, the film shows a characteristic transparent shadow and the intercostal spaces become widened.

Recently I saw a patient in whom collapse and emphysema were noted in the same side of the chest simultaneously. The determination of the nature and position of the suspected foreign body and the mechanism by which it produced such a complicating condition was difficult because no definite history of the aspiration of a foreign body was obtainable.

An 8 month old girl was brought to the clinic on Nov. 15, 1934, because of severe cough and difficulty in breathing. She was hospitalized immediately.

The family history was irrelevant. The parents, who were farmers, and their three other children were in good health. There was no history of tuberculosis or cancer in the family.

The birth of this child was normal. She had never been seriously ill. She was breast fed. Shortly before the onset of the present illness the child had begun to eat boiled sweet potato. She was just beginning to crawl, and she would put anything she grasped in her mouth. At about 6 o'clock in the morning the mother heard a violent cry from the child, who was playing alone on a mat. The child was found to be markedly dyspneic, and the face was cyanosed. In an attempt to remove any possible foreign body the mother inserted a finger into the child's mouth, but she could not find anything. On the mat nearby, however, was a piece of wet straw from 2 to 3 inches (5 to 7 cm.) long. It is probable that this came out of the child's mouth. Shortly afterward the child's respiration became less labored, and the cyanosis disappeared; however, paroxysmal coughing and dyspnea recurred at frequent intervals. The child was taken to a local physician and then to an otolaryngologist, but a diagnosis of a foreign body in the bronchus was not made. Because the alarming symptoms persisted, the mother brought the child to our clinic.

At the clinic it was noted that severe cough and dyspnea followed the movement of the child's body from side to side. These symptoms aroused suspicion of the presence of a foreign body in the bronchus, but there was no definite history

of aspiration, and the nature of the suspected foreign body was unknown. The patient was irritable from lack of sleep, although she had no difficulty in swallowing and she did not vomit.

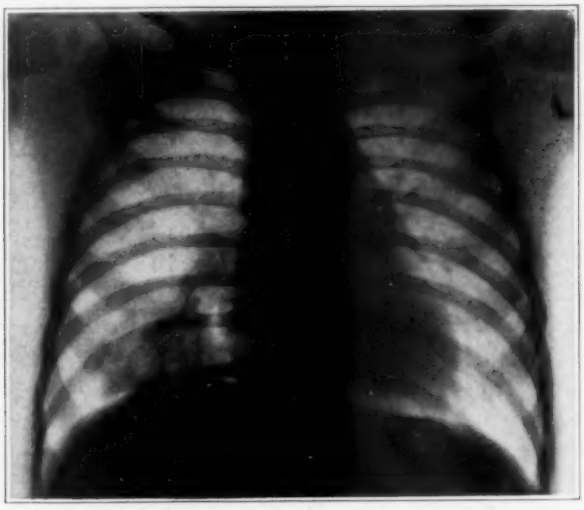


Fig. 1.—Roentgenogram taken during an inspiratory phase before bronchoscopy was performed.

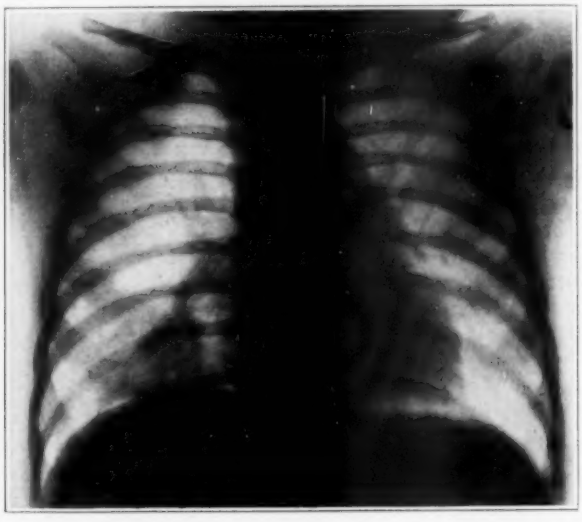


Fig. 2.—Roentgenogram taken during an expiratory phase before bronchoscopy was performed.

Physical examination showed that the infant was well developed and well nourished. The temperature was 39.1 C. (102.5 F.). The pulse rate was slightly accelerated, but the quality was good. The respiratory rate also was slightly rapid

and somewhat labored. During inspiration there was noticeable indrawing of the lower intercostal spaces and of the costal margin. The left lung was essentially normal. The breath sounds were diminished, and râles were heard over the entire anterior aspect of the right side of the chest. The percussion sound was impaired over the lower half of the right side of the chest posteriorly. The cardiac sounds were loud and somewhat rapid. The liver and spleen were not palpable. The knee jerks were equal and normal on the two sides. The Pirquet cutaneous reaction was negative.

The roentgenograms of the chest (figs. 1 and 2) were interesting. The heart and mediastinum were pushed toward the left, and the right border of the heart

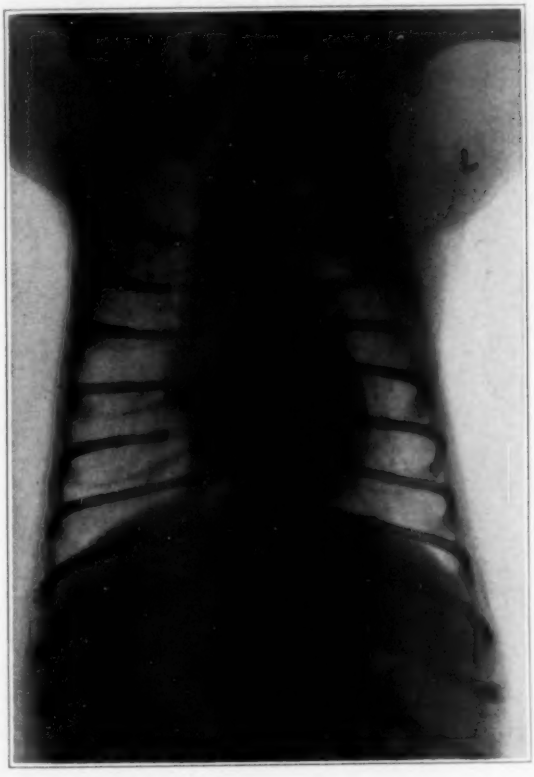


Fig. 3.—Roentgenogram showing the normal appearance of the chest of a dog.

was scarcely seen to the right of the sternal margin. In general the upper portion of the right lung was more transparent than that of the left. This was especially marked in the picture taken during expiration. Over the lower portion of the right lung there was a dense triangular shadow extending from the hilar region and spreading laterally and downward toward the costophrenic angle. The shadow was denser along the hilus down to the dome of the diaphragm. The right side of the diaphragm was higher than the left side, and its movement was definitely diminished. The right costophrenic angle was narrow, and the intercostal spaces were definitely wider than those on the contralateral side.

Examination of the ears and nose revealed no abnormality. The pharyngeal mucosa was slightly reddened, but the epiglottis was normal. No hoarseness was noted.

The results of the examination of the chest were difficult to interpret, particularly the roentgen findings. Although the films did not show a foreign body in the bronchus, certain changes that occurred which are usually secondary to bronchial obstruction pointed to a diagnosis of the presence of a foreign body. It was most probable that the foreign body was in the main bronchus of the

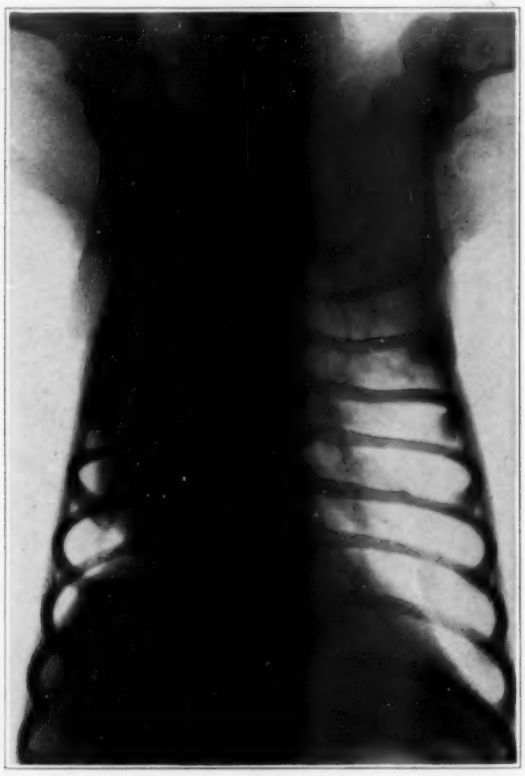


Fig. 4.—Roentgenogram showing atelectasis of the right lung as a result of artificial occlusion of the main bronchus of this lung with a foreign body. Note that the heart is displaced to the right and the diaphragm on the affected side is elevated.

right lung, creating a valvelike movement in the upper and middle bronchi and complete obstruction in the lower lobe. Consequently emphysema developed in the upper and middle lobes, while the lower lobe became collapsed.

By using dogs Yoshida performed an experiment on bronchial obstruction in my laboratory. Figure 3 is a roentgenogram of the chest of a normal dog; figure 4 shows the chest twenty-four hours after the main bronchus of the right lung had been completely obstructed

by a foreign body. The heart and mediastinum were pushed almost entirely into the right side of the chest, and the lung showed a marked increase in density. This is a typical picture of collapse of the right lung.

It is interesting to note some of the roentgenograms taken at the Jackson Clinic, of Philadelphia. Figure 5 shows atelectasis of the left

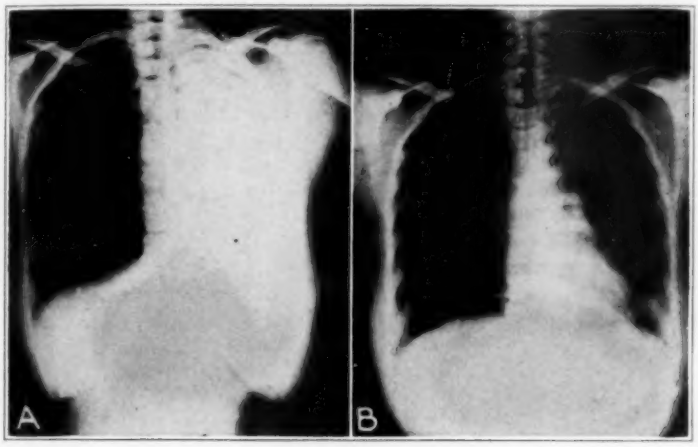


Fig. 5.—Roentgenogram showing massive atelectasis of the left lung due to complete occlusion of the main bronchus of the left lung by a tumor (Dr. L. H. Clerf). *A*, before bronchoscopic treatment; *B*, twenty-four hours after bronchoscopic treatment.

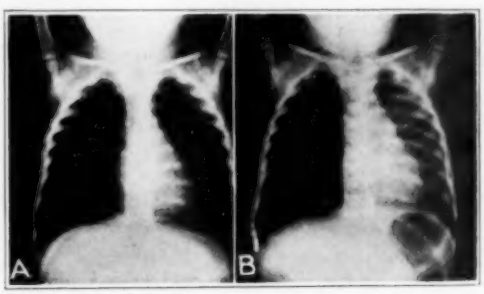


Fig. 6.—Roentgenogram showing obstructive emphysema of the right lung (Dr. L. H. Clerf). *A*, during an inspiratory phase; *B*, during an expiratory phase.

lung due to complete obstruction of the left bronchus. The heart and mediastinum are markedly displaced toward the left, and the field of the affected lung is densely shadowed. The movement of the left half of the diaphragm is diminished, and the intercostal spaces on this side are narrow. In contrast to this, figure 6 shows the conditions seen when a foreign body is present in the right bronchus. The roentgenogram

taken during inspiration shows practically no abnormality, while the one taken during expiration shows the heart and mediastinum displaced toward the normal side. The left lung is relatively darker than the right. The right lung is much clearer, and the intercostal spaces on that side are wider. The right half of the diaphragm is lower than the left. These findings simulate the picture produced by a foreign body in the left bronchus, but in reality it is the picture of the obstruction of the right bronchus. The foreign body is acting as a valve and is producing emphysema of the involved lung.

These facts show how difficult it is to make a correct diagnosis by means of roentgenograms. Careful observation by an experienced person is required; otherwise a false interpretation may often be given.

Fig. 7.—The ear of wheat removed from the main bronchus of the right lung by bronchoscopy. Two small fragments were first removed piecemeal.

Figures 1 and 2 show a slightly denser shadow in the left lung, and the heart and mediastinum are displaced toward the left. In these cases the first thought is of obstruction of the left bronchus with collapse of the left lung. However, almost the same condition may be observed in a case of obstruction of the right bronchus by an expiratory valvelike foreign body. Emphysema develops in the right side, and the inflated lung pushes the heart and mediastinum toward the healthy side. In this case the picture resembles that of a left lung that is collapsed as a result of obstruction of the left bronchus. In the case of emphysema of the right lung, however, the diaphragm of the corresponding side is pushed downward, the intercostal space is widened and the costophrenic angle is narrowed. Also, in spite of the relatively increased

density of the healthy left lung during expiration, the upper portion of the right lung is transparent. However, the roentgenograms in this case show a triangular shadow in the lower portion of the right lung. The density of this shadow is not altered by respiration. The apex of the shadow is directed toward the hilus, and its base extends toward the diaphragm. This shadow is considered to be due to collapse of the lower lobe because of complete bronchial obstruction.

I have never seen a roentgenogram more difficult to interpret than this one, nor have I seen a similar one reproduced in the literature. It is also unusual not to have any definite information regarding the inhalation of a foreign body.

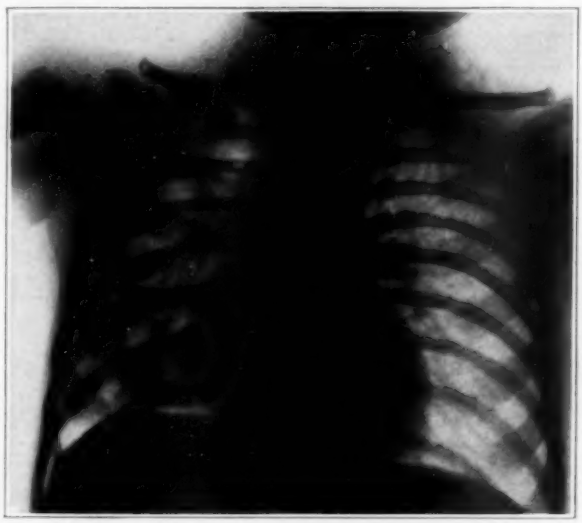


Fig. 8.—Roentgenogram made four and one-half hours after the removal of the foreign body.

Such a complicated problem is best solved by means of bronchoscopic examination. Such examination, followed by removal of the foreign body, was performed in my case as follows:

On November 16 the child's temperature was 37.9 C (100 F.). She was irritable, and her appetite was poor. Spells of paroxysmal coughing were still frequent. At noon when the bowels moved a piece of the beard from an ear of wheat was found in the stool. It measured about 1.5 cm. in length.

On November 17 the temperature was 38 C. (100.5 F.). Dulness over the posterior aspect of the lower right side of the chest was increased slightly. With the area under cocaine anesthesia and with the head dependent, a bronchoscope, 0.6 cm. in diameter and 18 cm. long, was inserted into the right bronchus.

The larynx, trachea and left bronchus were observed to be normal. Near the beginning of the right bronchus there was an accumulation of brownish-yellow

tenacious mucoid secretion. The mucosa around this area was swollen and red. After the secretion was removed, it was found that the right bronchus distal to the bifurcation was filled with a material resembling chaff and that numerous bristle-like particles were pointing upward. Some of these were removed, and they were

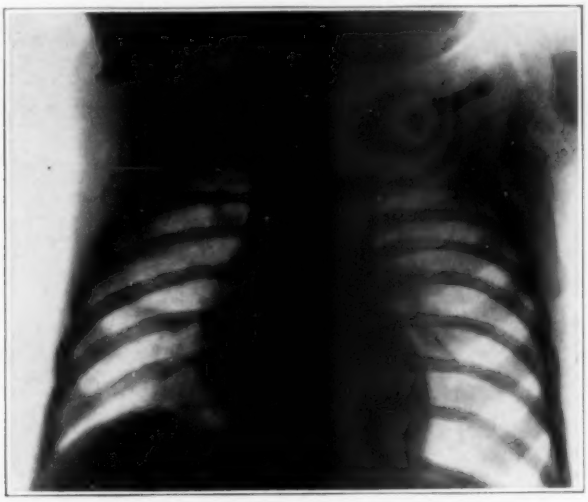


Fig. 9.—Inspiration four days after the removal of the foreign body.

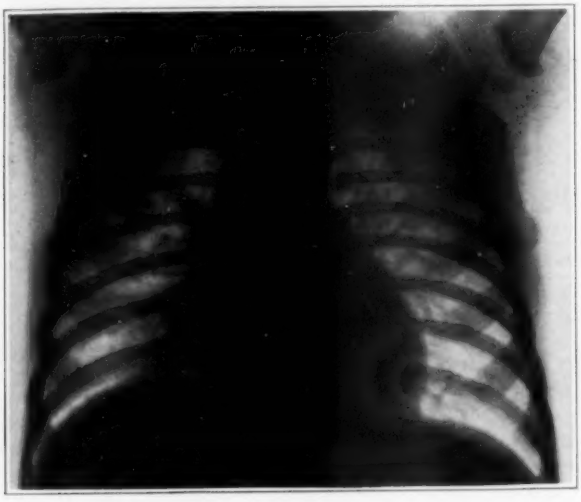


Fig. 10.—Expiration four days after the removal of the foreign body.

found to be the beard of a head of wheat (the small particles shown in figure 7). After removal of the beard it was found that the deeper portion of the bronchus was completely obstructed by a head of wheat, measuring 3.5 cm. in length (fig. 7). It was lodged with its base downward and with the beard pointing upward. A

large amount of secretion which was found distal to the foreign body was removed by suction and also with a cotton swab through the bronchoscope in about ten minutes.

The breath sound in the affected lung became much stronger after the removal of the foreign body. The roentgenogram taken four and a half hours later showed replacement of the mediastinum and heart almost to their normal positions. The upper portion of the right lung still showed slight transparency, while the density of the lower part was moderately increased (fig. 8).

On November 18 dyspnea was no longer present, but the child still coughed occasionally. Numerous fine crepitant râles were heard over the base of the right lung. Because there were signs of an accumulation of bronchial secretion, bronchoscopy was performed once more, and a large amount of thick, tenacious secretion was removed from the right bronchus. After this treatment there was rapid improvement in the child's condition. The roentgenogram made four days after the operation showed a practically normal picture. The heart and mediastinum were in their normal positions, and the right cardiac border was clearly seen to

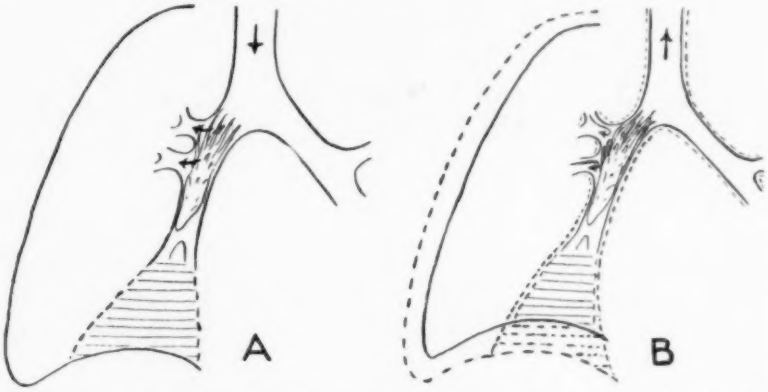


Fig. 11.—*A*, during inspiration air is allowed to enter the upper and middle lobes owing to enlargement of the bronchial lumen. *B*, during expiration air is trapped in the upper and middle lobes because of the check-valve action produced by the foreign body and the contraction of the wall of the bronchus.

the right of the sternum. The emphysema of the upper lobe of the right lung had disappeared, and the diaphragm was in a normal position (figs. 9 and 10). The child became afebrile on the fifth day after the operation, and she was discharged ten days after her admission to the hospital.

A physical examination made twenty days after the child's discharge from the hospital showed that the chest was entirely normal.

From the bronchoscopic and roentgenographic examinations it is certain that the lower bronchus of the right lung was completely obstructed by the hard portion of the head of wheat. This caused an accumulation of the bronchial secretion and collapse of the lobe. The bronchi for the upper and middle lobes were obstructed by the soft part of the ear of wheat. During inspiration the bronchi were dilated,

and air was allowed to enter the lung; but the obstruction was in effect during expiration, and the lumen of the bronchi was contracted. This expiratory valvelike obstruction was the cause of the emphysema (fig. 11).

SUMMARY

In this case unilateral emphysema and collapse of one lung were caused by the inhalation of a head of wheat. The solid portion of the ear of wheat caused complete obstruction of the lower bronchus of the right lobe, while the soft bearded portion acted as an expiratory valve for the upper and the middle bronchus. The accumulated bronchial secretion and the foreign body were removed by bronchoscopy. The patient made a complete recovery and was discharged ten days after her entry into the hospital.

4 Kōgai-cho, Azabu-Ku.

CHRONIC INFECTIONS IN THE PHARYNX

A PATHOLOGIC STUDY

HARRY P. SCHENCK, M.D.
PHILADELPHIA

This report summarizes the histologic changes observed in biopsy material from the pharynges of 108 patients with systemic manifestations of disease usually attributed to some form of focal infection. The primary object was to determine the presence or absence of histologically specific lesions peculiar to each type of disease included in this study. In each instance the tonsils and adenoids had been removed prior to the onset of the presenting symptoms. There was obvious abnormality of the pharynx in every case, with either absence of tonsils or a minimal amount of tonsillar fragments.

For purposes of comparison similar biopsy specimens were obtained from the pharynges of 10 normal adults (ages ranging from 21 to 64 years) and 10 normal children (ages ranging from 2 to 11 years). Five adults and 5 children in this group had previously undergone operations for the removal of tonsils and adenoids.

Although all portions of Waldeyer's ring are potential participants in the production of systemic manifestations, most investigations have focused on the pharyngeal and faucial tonsils. The pharynx has received attention mainly in those instances in which acute infection has appeared to be the direct precipitating factor in arthritis, rheumatism, chorea, acute serofibrinous pericarditis,[1] albuminuria,[2] acute glomerulonephritis [3] or hematogenous peritonitis.[4] That chronic infection of the pharynx may be attended by an insidious train of conse-

---

From the Department of Otolaryngology of the Hospital of the University of Pennsylvania.

Read before the Fifty-Eighth Annual Congress of the American Laryngological Association, Detroit, May 26, 1936.

1. Wilkins, F. A.: Clinic on Acute Serofibrinous Pericarditis Secondary to Acute Pharyngitis, Proc. Staff Meet., Mayo Clin. **9**:637 (Oct. 17) 1934.

2. Merle, E.: Pensons toujours aux infections pharyngees chez nos albuminuriques, J. méd. franç. **19**:396 (Oct. 30) 1934. de Wesselow, O. L. V. S.; Goadby, H. K., and Derry, D. C. L.: Tonsillitis and Albuminuria, Brit. M. J. **1**:1065 (May 25) 1935.

3. Seegal, B. C., and Lyttle, J. D.: The Nature of the Preceding Infection in Acute Glomerulonephritis in Two New York Hospitals and in Four Southern Hospitals, J. A. M. A. **105**:17 (July 6) 1935.

4. Felsen, J., and Osofsky, A. G.: Pharyngogenic Hematogenous Streptococcic Peritonitis, Arch. Surg. **31**:437 (Sept.) 1935.

quences had been anticipated in view of the rapid systemic effects of acute lesions in this area. The regional and general manifestations of focal infection in the pharynx and the upper respiratory tract have been especially emphasized by Mackenty,[5] Coates[6] and Mosher.[7]

The following observations by various investigators appeared to warrant further study of the histopathologic changes in the pharynx:

1. When there is evidence of focal infection with other obvious foci missing, the pharyngeal tissue is frequently abnormal.

2. Symptoms which disappear after tonsillectomy often return as the extratonsillar tissue in turn becomes infected and hypertrophic.

3. Exacerbations of chronic systemic manifestations commonly follow or coincide with acute infection of the pharynx.

4. Exacerbation of systemic symptoms, with or without fever, may follow electrocoagulation of abnormal pharyngeal lymph nodules.

5. In selected instances of arthritis, neuritis or myositis, relief from symptoms may follow sufficient destruction of abnormal extratonsillar tissue.

6. In juvenile rheumatism, the rate of sedimentation is frequently elevated.[8] Electrocoagulation of the pharyngeal follicles of patients with juvenile rheumatism, all of whom had had tonsils and adenoids removed prior to the onset of the condition, was followed by a definite lowering of the rate of sedimentation,[9] an indication of clinical improvement.[10]

7. So-called compensatory hypertrophy of extratonsillar tissue rarely occurs in association with subclinical manifestations.

8. Infection and hypertrophy of pharyngeal lymph follicles may occur without apparent involvement of the tonsils proper.[11]

9. Some patients with unexplained continued low grade fever regain a normal temperature level after sufficient destruction of abnormal lymphoid nodules in the pharynx.

---

5. Mackenty, J. E.: Upper Respiratory Focal Infections in Some of Their Regional and General Manifestations, Bull. New York Acad. Med. **7**:71 (Feb.) 1931.

6. Coates, G. M.: Focal Infections in Early Childhood, Pennsylvania M. J. **35**:389 (March) 1932.

7. Mosher, Harris P.: The Submaxillary Fossa Approach to Deep Pus in the Neck, Tr. Am. Acad. Ophth. **34**:19, 1929.

8. Payne, W. W., and Schlesinger, Bernard: A Study of the Sedimentation Rate in Juvenile Rheumatism, Arch. Dis. Childhood **10**:403 (Dec.) 1935.

9. Schenck, H. P.: Chronic Pharyngeal Infections in Children, Pan-American Medical Congress, Rio de Janeiro, July 1935.

10. Wood, Paul: The Erythrocyte Sedimentation Rate in Disease of the Heart, Quart. J. Med. **5**:1 (Jan.) 1936.

11. Wood, V. V.: Clinical Consideration of Inflammations and Infections of Extratonsillar Lymphoid Tissue Before and After Tonsillectomy, Tr. Am. Laryng., Rhin. & Otol. Soc. **33**:126, 1927.

Abnormal appearance of the pharyngeal lymph nodules, per se, is not adequate evidence for the assumption that systemic disease must result. As in Hodgkin's disease, abnormality of pharyngeal tissue may be a part of a general alteration in lymphoid structures throughout the body; it would be fallacious to assume an etiologic significance in similar diseases which produce both general manifestations and alteration in lymphoid structure. That collections of lymphoid cells in the upper respiratory tract may be a portal of entry of infection is indicated by the studies of Fraser,[12] who reported on the histologic examination of pharyngeal tissues and cervical lymph nodes of 4 patients dying of rheumatic fever uncomplicated by other disease. He found Aschoff nodules or rheumatic nodules and the scars of previous lesions in the wall of the pharynx and in the tongue, larynx and esophagus. The nodules were especially numerous near the tonsils (lingual, faucial and pharyngeal). The cervical lymph nodes generally presented marked proliferation of the endothelial cells of the sinuses, blood vessels and reticulum, accompanied by marked infiltration of the stroma by plasma and polymorphonuclear cells. Fraser's patients presented pharyngeal lesions which provided a specific histologic basis for the sore throat so frequently associated with rheumatic infection. The symmetrical distribution of the lesions around the lymphoid tissue of the throat suggests that the tonsils and less frequently the other collections of lymphoid cells are the portal of entry of the infection. That there may be no clinical evidence of the presence of such lesions about the tonsils is shown by the fact that 3 of 4 patients had no local symptoms or made no complaint of "throat trouble." Rheumatic lesions in the neighborhood of the tonsils have been described by Shaw,[13] Groff,[14] Klinge [15] and Yoshitake.[16] The lesions are characterized by degeneration of the collagen fibers and an increase of fibroblasts. Lymphocytes and plasma cells play a minor rôle, and multinucleated cells are sparse. Polymorphonuclear cells are rarely present.

TECHNIC

Tissue was obtained from the pharynx by means of a Grünwald biting forceps without the use of either local or general anesthesia. A single application of a

12. Fraser, A. D.: Lesions of the Pharynx in Acute Rheumatism, Arch. Dis. Childhood **7**:181 (Aug.) 1932.

13. Shaw, A. F. B.: Topography and Pathogenesis of Lesions in Rheumatic Fever, Arch. Dis. Childhood **4**:155 (Aug.) 1929.

14. Groff, S.: Primaerinfekt und Invasionsstelle beim Rheumatismus infectiosus specificus, Deutsche med. Wchnschr. **56**:603, 1930.

15. Klinge, F.: Das Gewebsbild des fieberhaften Rheumatismus, Virchows Arch. f. path. Anat. **278**:438, 1930.

16. Yoshitake, S.: Rheumatismus infectiosus specificus der oberen Speiswege und des Kehlkopfes, Ztschr. f. Hals-, Nasen- u. Ohrenh. **26**:366, 1930.

15 per cent solution of silver nitrate with a cotton wound applicator was made to the denuded surface, and further measures were found unnecessary. Since access to the nasopharynx required the use of a Yankauer speculum or a similar instrument, which interfered with the rapid and precise removal of tissue, most of the sections represent oropharyngeal tissue. The biopsy specimen was immediately immersed in a 4 per cent dilution of solution of formaldehyde U. S. P. for fixation. Double staining with hematoxylin and eosin was employed. No bacteriologic studies were made.

CHARACTERISTICS OF PHARYNGEAL TISSUE OF PRESUMABLY NORMAL PERSONS

Both adults and children in the group of so-called normal patients were free from demonstrable systemic disease and presented pharynges of normal color and texture.

In this group there was surprisingly little histologic variation between the follicles of children and those of adults under 40 years of age. Immature lymphoid cells were commonly found in the central portion of nodules removed from children, while similar forms were rare in adults. In adults over 40 years of age the follicles were smaller, less cellular and almost free from polyblasts, but neither fibrosis nor fatty infiltration was noted. It was impossible to differentiate under the microscope between the nodules obtained from persons previously tonsillectomized and those from persons with the faucial and pharyngeal tonsils intact.

Figure 1 shows normal pharyngeal tissue from an adult aged 35. The stratified squamous epithelium is composed of sharply stained cells, and the basal layer of cells is clearly delimited by the basement membrane. The epithelial cells are free from vacuolation and invading cells. The tunica propria is composed of fibro-elastic connective tissue supporting spindle-shaped or stellate connective tissue cells. Lymph spaces occur between the bundles of stroma tissue. True papillae are absent, and no blood vessels are present within the epithelium. As would be expected in an organ requiring alteration in position and in tension of the mucous membrane, there is an especially loose arrangement of the cells in the submucous layer.

Figure 2 shows normal pharyngeal tissue from a boy aged 7 years. In this specimen small bits of tissue are often entirely free from collections of lymphoid cells. The integrity of the epithelium in this section is manifest. Mucous glands are conspicuous and occur at depths well beneath the usual position of lymph nodules.

Figure 3 shows a section of the same normal pharyngeal nodule from which the section shown in figure 1 was taken. The normal lymph nodules are generally free from peripheral fibrous tissue so arranged as to constitute a capsule, but peripheral lymph channels are numerous. In the nodules the lymphocytes, while not densely packed, predominate to the extent of obscuring other cells. The lymphocytes are uniform in size and in staining reaction, and no mitotic figures

Fig. 1.—Normal adult pharyngeal tissue; × 72.

Fig. 2.—Normal pharyngeal tissue from a child; × 306.

are found. Polyblasts are sparse, and the fibrous tissue stroma is inconspicuous. It is rare to find plasma cells or eosinophils, and in no instance were giant cells found.

In the twenty sections from normal pharynges, epithelial pegs were absent, and the so-called germinal centers were vague because of the paucity of cells showing mitotic division. The mucous glands occurred at a considerable depth, and there was no constant relation between the glands and their ducts and the lymph nodules.

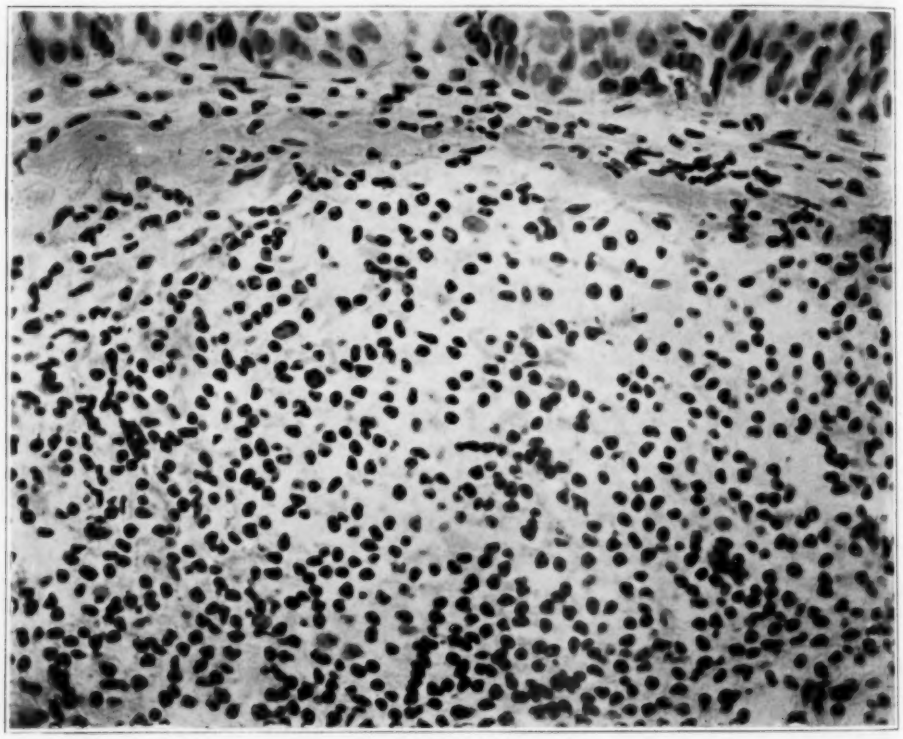


Fig. 3.—Normal tissue from the same nodule shown in figure 1; × 306.

CHARACTERISTICS OF PHARYNGEAL TISSUE OF PATIENTS WITH SYSTEMIC DISEASE

Of the 108 patients selected for study, 35 had articular pain, without redness or swelling, 20 had choreiform manifestations, 22 had cervical adenopathy with low grade fever, 14 had chronic myalgia, 12 had nephrosis and 5 had unexplained fever. Each patient was hospitalized for investigation by the medical service. Infection of the paranasal sinuses was not present as a continuing major factor in the induction of systemic effects or as an influence on the pharynx by postnasal drainage.

Only those patients presenting negligible remnants of faucial or pharyngeal tonsils were selected for investigation. The sections of tissue were obtained prior to treatment of the pharynx.

Group A: Patients with Articular Pain without Redness or Swelling.—Of the 35 patients in this group, 19 were found to have sufficient cardiac involvement at the time of hospitalization to lead to a clinical diagnosis of rheumatic heart disease. There were 18 children and 17 adults.

Fig. 4.—Pharyngeal tissue from a child with articular pains; × 72.

Figure 4 shows a section of tissue from a girl aged 8 years. This section contains a lymph nodule which has obviously undergone marked hyperplasia. Extensive chronic inflammatory changes have followed, with sufficient invasion of fibroblasts to form pseudofollicles. Fibrosis gradually obliterates the peripheral lymph spaces, and with obstruction certain lymph channels become dilated. A characteristic which is especially striking is the appearance of a dense zone of fibroblasts about the lymph nodule; this zone of young fibrous tissue cells first appears on the border of the lymph nodule which is nearest the epithelium but eventually surrounds the nodule and results in destruction of lymphocytes. Nuclear fragments are always conspicuous in the zone of active fibrosis. The epithelium

is the seat of occasional infiltration with polymorphonuclear cells. An intact gland duct is present in the lower right corner of the section.

Figure 5 shows pharyngeal tissue from a girl aged 8 years. This section shows early invasion of the epithelium and beginning vacuolation of the epithelial cells. Young fibrous tissue cells are beginning to invade the basal membrane. There is proliferation of endothelial cells in the peripheral lymph spaces, which probably accentuates the obstruction initiated by fibrosis about the lymph channels.

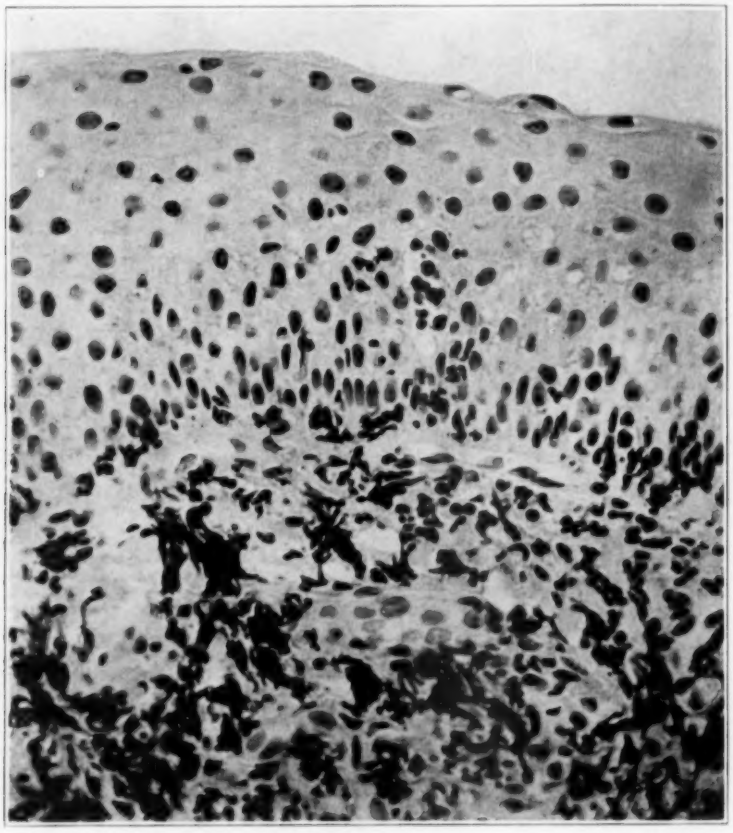


Fig. 5.—Pharyngeal tissue from a child with articular pains; × 306.

The presence of epithelial cells well below the basement membrane was common in the sections of tissue showing chronic inflammatory changes. In some instances the peg could be demonstrated to be a portion of a crypt, the lumen of which was filled with polymorphonuclear cells and débris. The amount of nuclear fragmentation in the areas of densest concentration of fibrous tissue was impressive. It appears that the nuclear fragments largely represent the destruction of lymphocytes. The absence of plasma cells and eosinophils as well as of polymorphonuclear cells in the central portions of the nodules was characteristic.

Figure 6 shows a section of tissue from a man aged 41. The disappearance of lymph cells in this nodule is obvious. The few lymphocytes remaining are

irregular in size and in staining reaction. There is an apparent increase of polyblasts, which may be due to an accentuation of their morphologic structure in the absence of the usual large numbers of lymph cells. The supporting reticulum in those portions of the nodule surrounded by fibrous tissue is granular and fragmented. Giant cells are lacking. At most, one or two plasma cells may be identified. The most striking phenomenon, however, is the dense zone of young fibrous tissue cells. In this zone the nuclear fragments are most conspicuous and the lymph channels appear to be obliterated. Epithelial pegs approach the follicle.

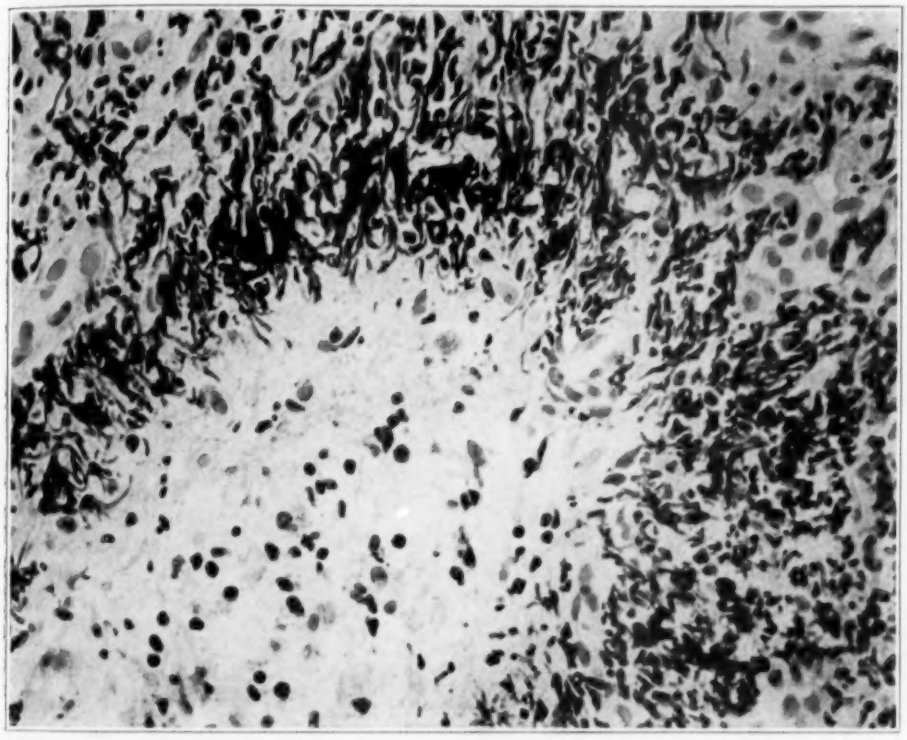


Fig. 6.—Tissue from the pharynx of a man with articular pains; × 306.

Group B: Patients with Choreiform Manifestations.—Of the 20 persons in this group, all were children, the ages ranging from 4 to 11 years.

Figure 7 shows a section of tissue from a girl aged 7 years. This section too presents evidence of marked hyperplasia and chronic inflammation. As the result of hyperplasia of the lymphoid elements the contour of the epithelial surface is altered and the epithelium is actually invaded. Vacuolation of the epithelial cells occurs, as the invasion of fibrous tissue cells penetrates beyond the basement membrane. Lymphocytes and occasional plasma and polymorphonuclear cells accompany the invading fibroblasts. The accumulations of hyperplastic lymphoid tissue extend well below the original limits of the lymph nodule. Fibrosis is greatest and occurs first between the basement membrane of the epithelium and

the lymph nodule, but eventually the fibrosis extends completely about the nodule and invades the contiguous accumulations of lymph cells, forming pseudonodules. The obliteration of lymph channels is proportional to the degree of fibrosis. Mitosis is less marked within the original limits of the nodule than in the collections of cells beyond those limits. The break in the surface is an artefact.

Figure 8 shows a section of pharyngeal tissue from a boy aged 6 years. Dilatation of certain lymph channels is present owing to the combined obstruction by fibrosis about the channels and proliferation of endothelium within the channels.

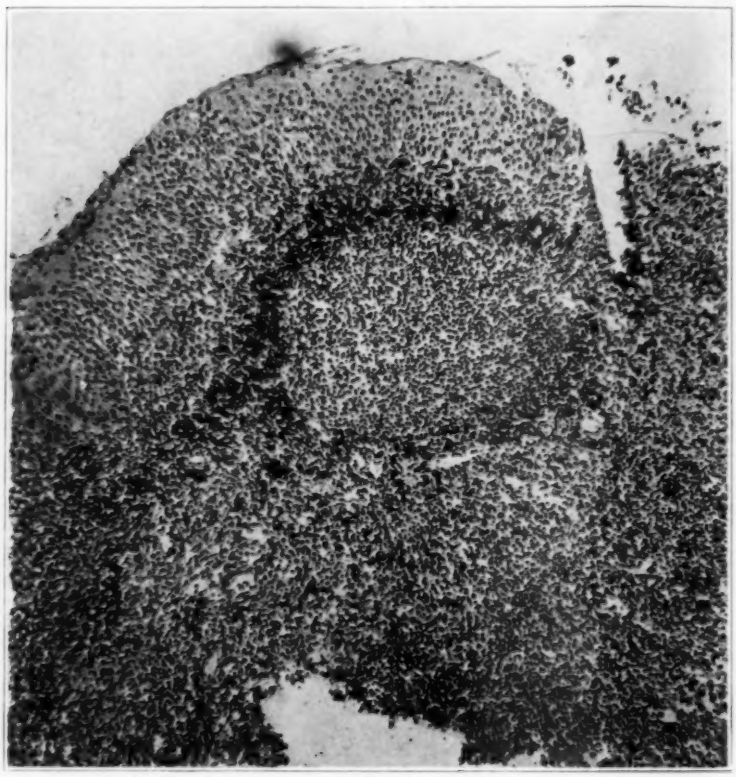


Fig. 7.—Pharyngeal tissue from a child with choreiform movements; × 72.

In such dilated lymph vessels, numerous cells may be found. In this instance a dilated lymph vessel contains many lymph cells and one plasma cell.

Figure 9 shows a section of tissue from a youth aged 21. This section presents evidence of marked hyperplasia of the lymphoidal structure and chronic inflammatory changes. There are degeneration and invasion of the epithelium. The earliest and most marked activity of fibroblasts is exhibited between the nodules and the basement membrane of the epithelium. There are no specific characteristics in this section to differentiate the lesion from those shown in sections from patients of the other groups.

The section shown in figure 10 was taken from a girl aged 9 years. A nodule with early involvement presents no proliferation of fibrous tissue elements, but there is beginning invasion of the epithelium by polymorphonuclear cells. Early

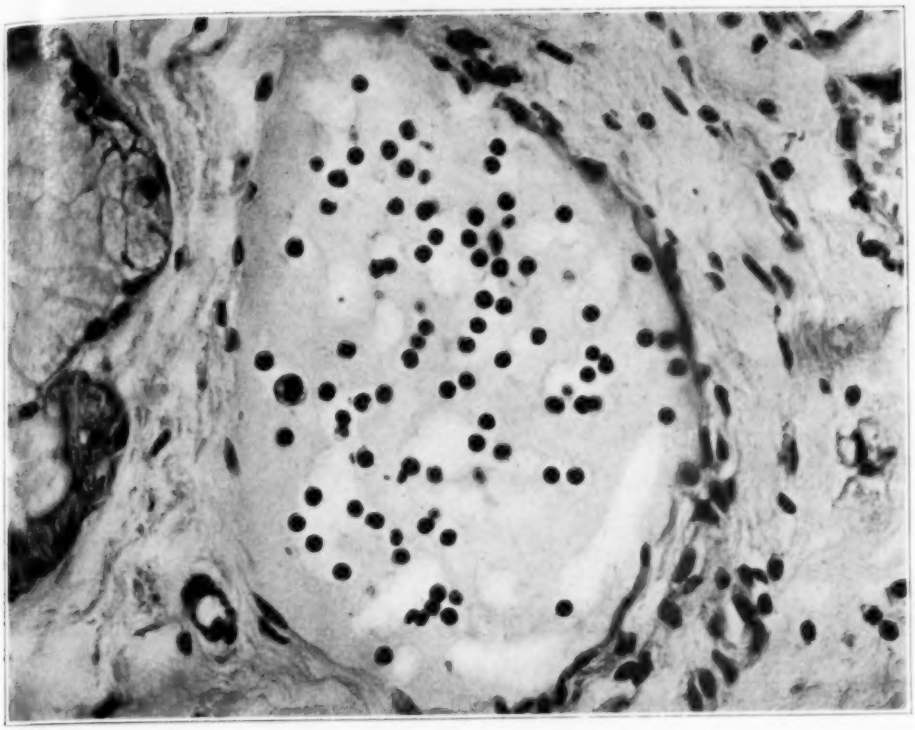


Fig. 8.—Pharyngeal tissue from a boy with choreiform movements; × 436.

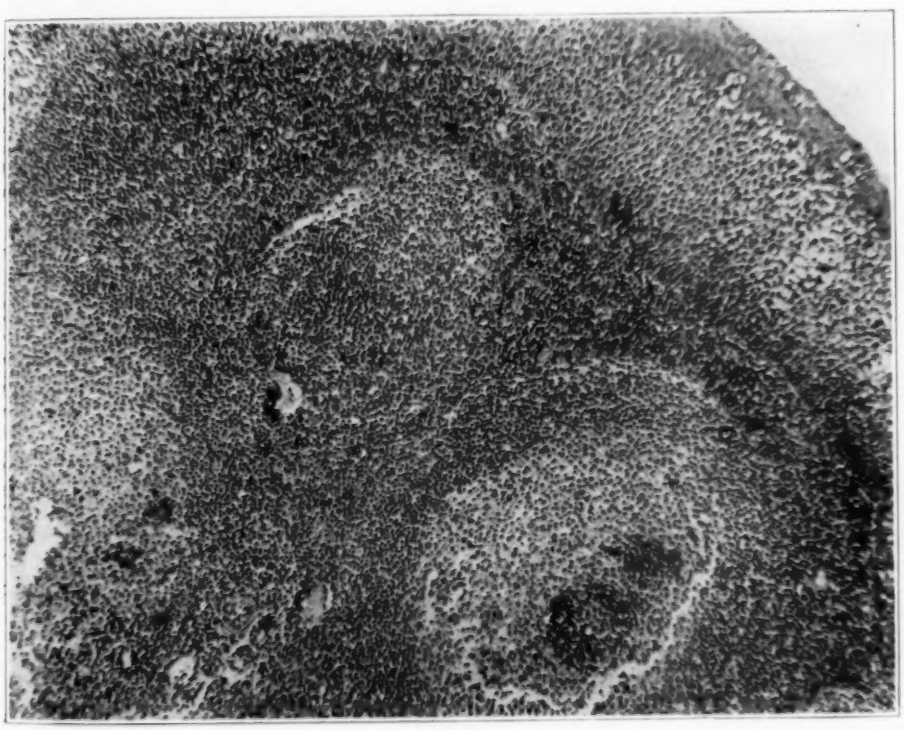


Fig. 9.—Pharyngeal tissue from a young adult with choreiform movements; × 102.

hyperplasia of the nodule has resulted in encroachment on the tunica propria. The peripheral lymph spaces are not yet obliterated.

Group C: Patients with Chronic Myalgia.—Of the 14 persons in this group, all were adults, the ages ranging from 24 to 64 years.

Figure 11 shows a section of tissue from a woman aged 20. There is evident hyperplasia and chronic inflammation. Formation of crypts and loss of integrity of the basement membrane of the epithelium have occurred. Invasion and degeneration of the epithelium are most marked about the crypt. The original

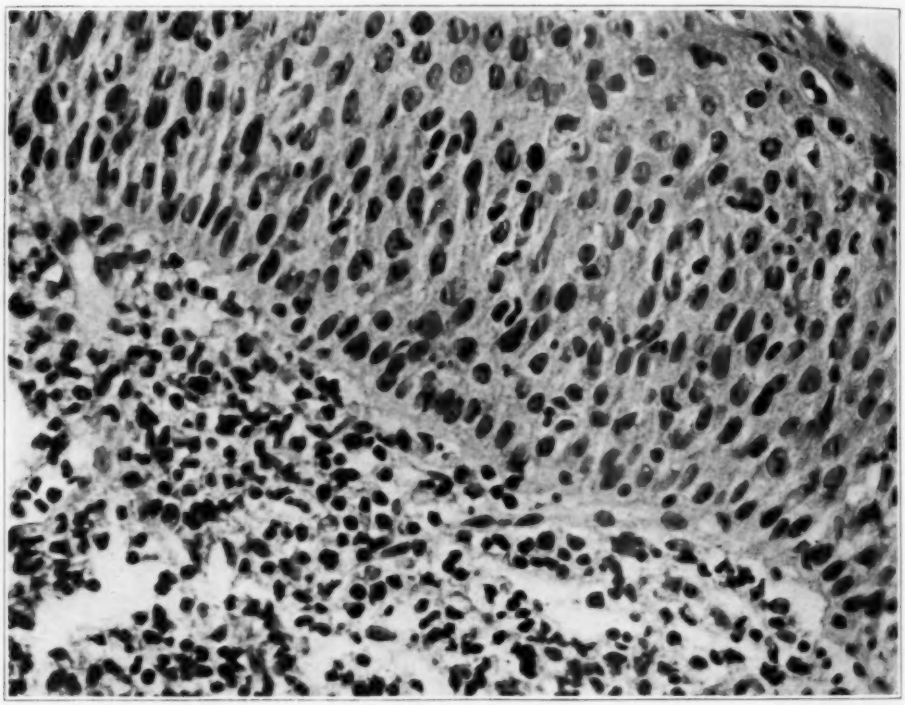


Fig. 10.—Pharyngeal tissue from a child with choreiform movements; × 436.

boundary, or outline, of the nodules can be found by tracing the infiltration of fibrous tissue.

Figure 12 shows a section of tissue from a boy aged 9 years. There is vacuolation of the epithelial cells, with profuse infiltration of cells arising beneath the basement membrane.

Group D: Patients with Nephrosis.—Of 12 patients with nephrosis, 9 were adults and 3 were children. These patients as a group presented the most advanced chronic inflammatory changes. Nodules which grossly appear pallid and edematous usually exhibit the greatest fibrosis when examined microscopically.

Figure 13 *A* shows a section of tissue from a girl aged 12 years. In many areas the fibrosis has progressed to the extent of obliterating the other cellular

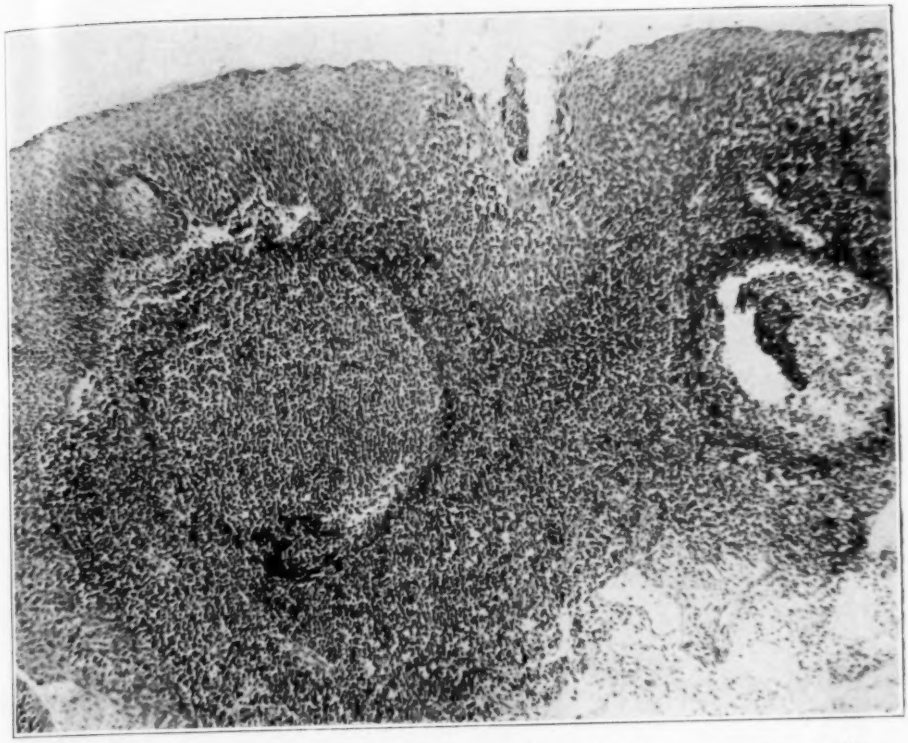


Fig. 11.—Pharyngeal tissue from a young adult with chronic myalgia; × 72.

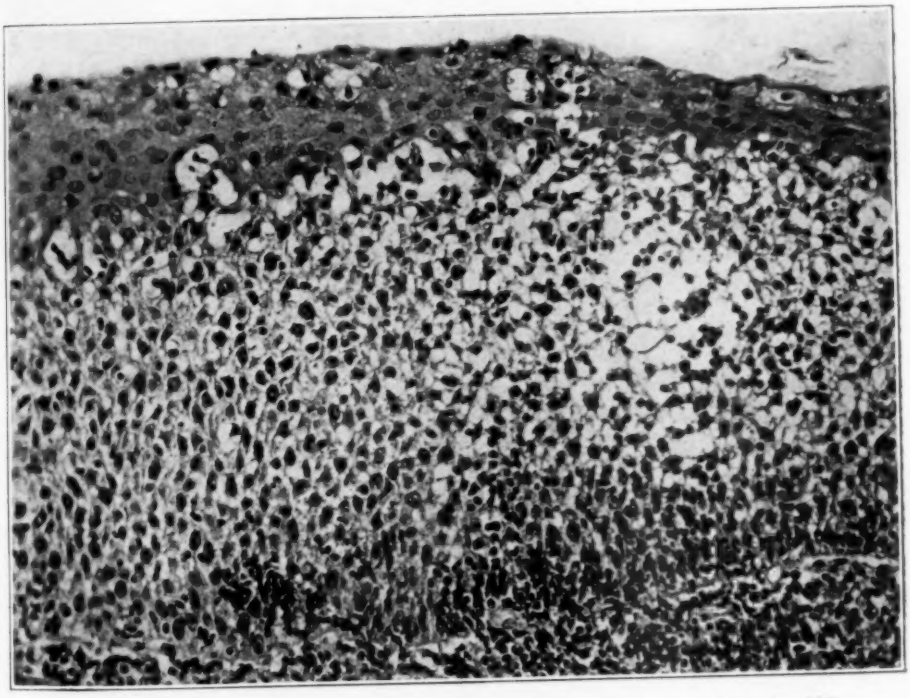


Fig. 12.—Pharyngeal tissue from a child with chronic myalgia; × 306.

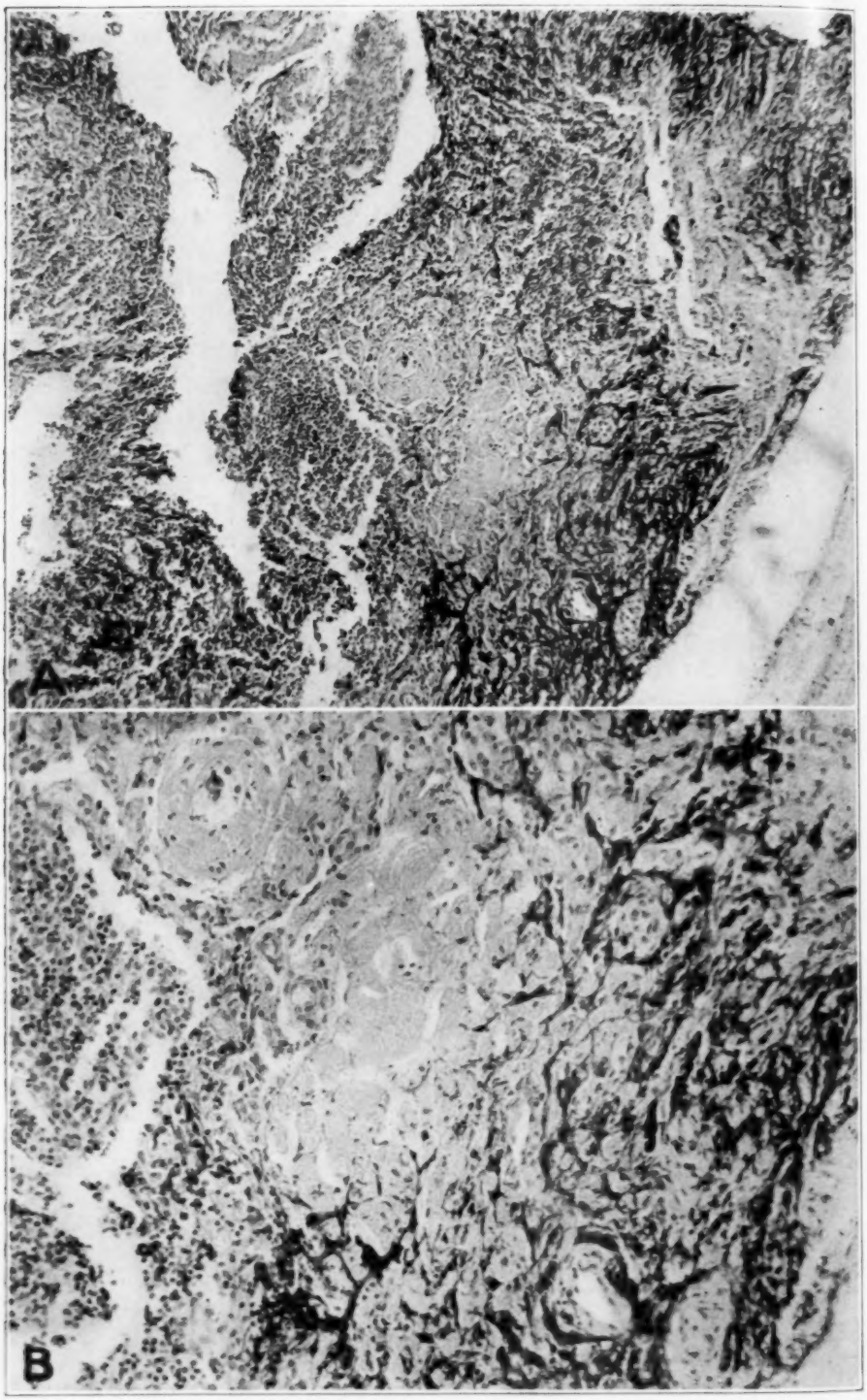


Fig. 13.—Pharyngeal tissue from a child with nephrosis; × 72.

elements. Hyaline masses appear to represent the former position of the lymph nodule. Endarteritis is evident in many fields. This section presents the most extreme effect of chronic inflammation encountered in the present study.

Figure 13 *B* shows the same section as figure 13 *A*, more highly magnified. There is absence of cells in the hyaline areas. The fibrous tissue cells have become condensed into dense strands.

Group E: Patients with Low Grade Fever.—Three adults and two children with low grade fever of undetermined origin are included in

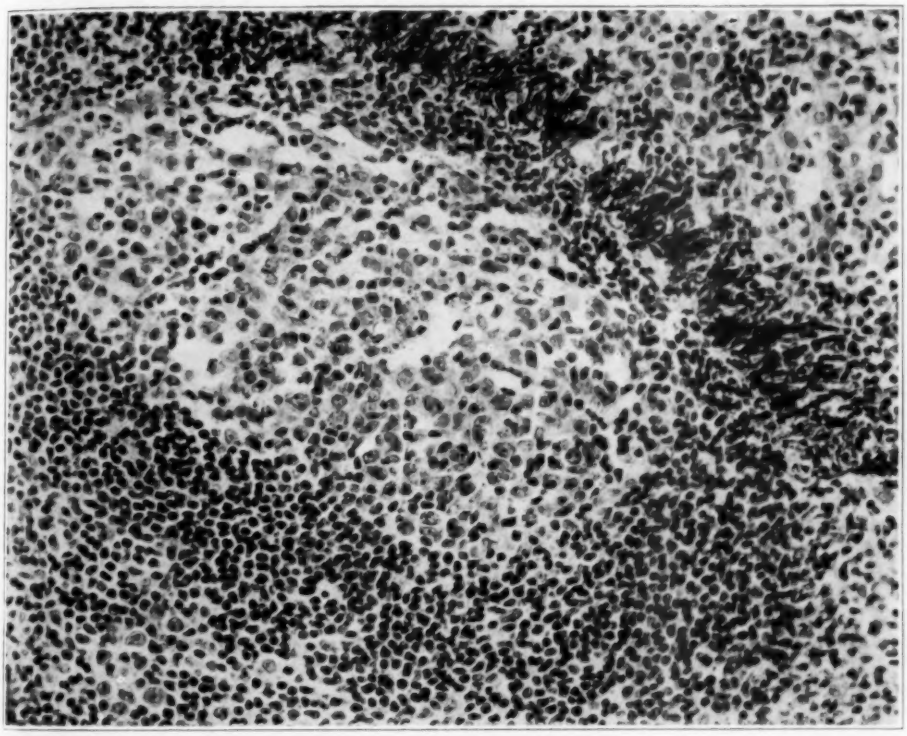


Fig. 14.—Pharyngeal tissue from a child with low grade fever; × 280.

this group. Of these, three adults and one child remained free from fever after the destruction of the accessible and apparently abnormal pharyngeal lymph nodules.

Figure 14 shows tissue from a girl aged 9 years. This section shows definite invasion of the epithelium. Infiltration of young fibrous tissue cells is present between the nodule and the basal membrane of the epithelium, and there is extension of both fibroblasts and lymphocytes into the epithelium. Occasional plasma cells can be distinguished in the central portion of the nodule, but the majority of the cells are probably polyblasts. Mitotic figures occur in cells distributed in the paler areas.

Figure 15 shows tissue from a man aged 25. There is attrition of the epithelium, but true ulceration cannot be demonstrated. Polyblasts are numerous, while polymorphonuclear cells are exceedingly rare. Lymphocytes together with occasional eosinophils and plasma cells have invaded the epithelium until only a thin layer of surface cells remains intact.

Figure 16 is a photomicrograph of pharyngeal tissue from a man aged 40. The section shows extension of an epithelial crypt into a nodule which presents evidence of lymphoid hyperplasia. The walls of the crypt appear fragile, while extensions of epithelial cells project into the surrounding tissue. The contents of such crypts are largely polymorphonuclear cells, although polymorphonuclear cells are sparse

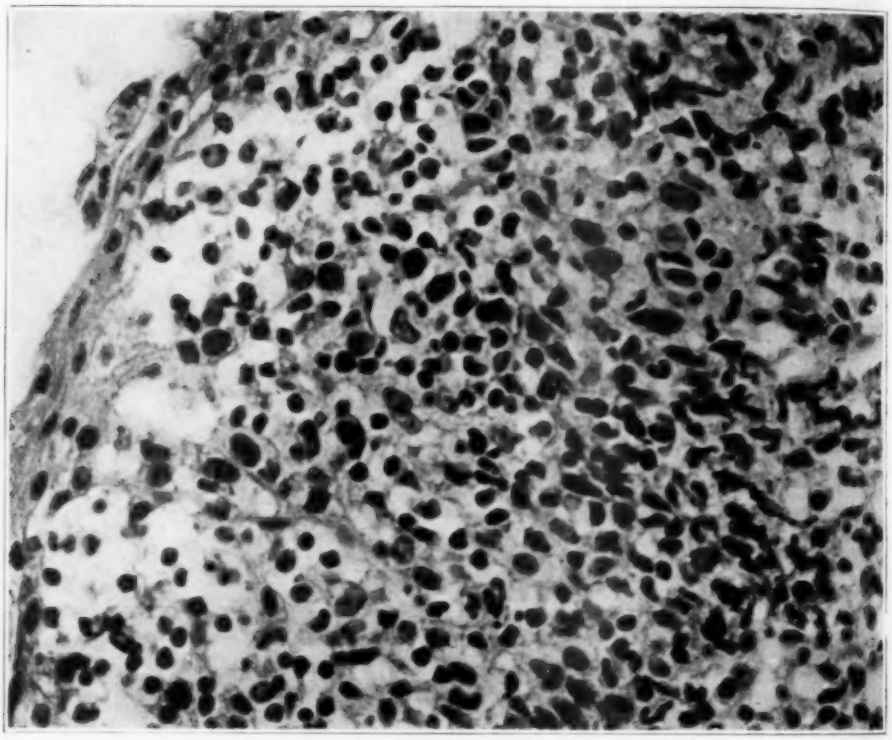


Fig. 15.—Pharyngeal tissue from a young adult with a low grade fever; × 566.

beyond the epithelial walls of the crypts. In the lumen of this crypt there are numerous desquamated epithelial cells, which may account for the fragile appearance of the wall.

In not a single section from 108 patients with systemic manifestations was there invasion or inflammatory change of the mucous glands.

Figure 17 shows the detail of a mucous gland. Both in sections of normal tissue and in those of abnormal tissue, the alveoli of the mucous glands were found to be uniform in size. Crescentic groups of cells resembling demilunes appear to be aggregations of serous cells.

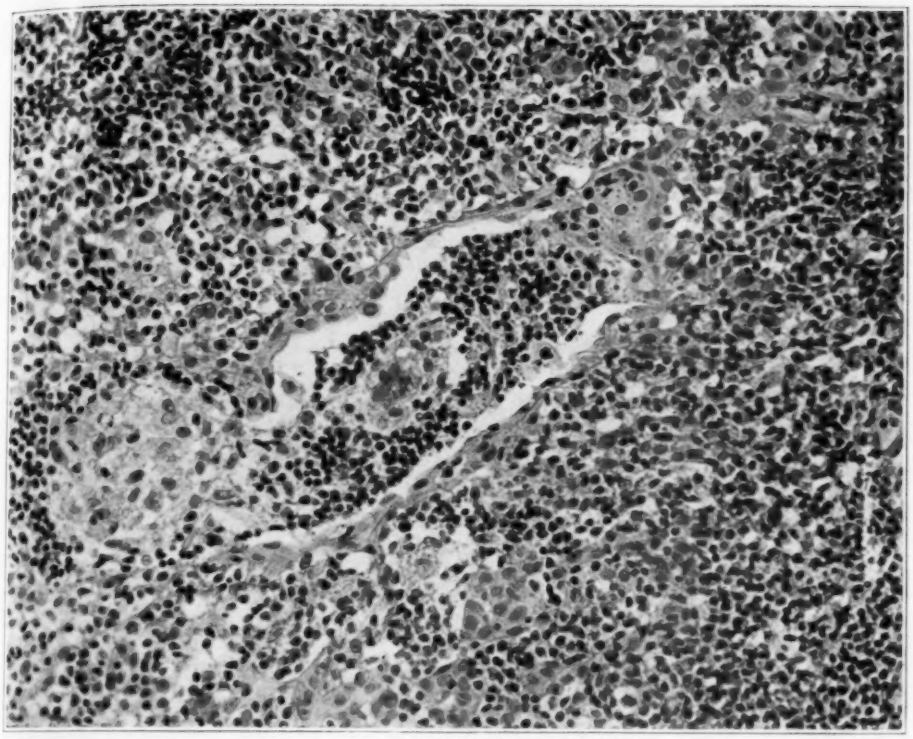


Fig. 16.—Pharyngeal tissue from an adult with a low grade fever; × 280.

Fig. 17.—Detail of a mucous gland.

In the sections of abnormal pharyngeal tissue there was usually a numerical increase of alveoli without other obvious change. It was surprising to find that in tissue obtained from conspicuous lateral pharyngeal bands the increase in bulk was due to hyperplasia of the glandular elements rather than to hyperplasia of the lymph tissue, although the latter was present and obvious. This appears to indicate a concomitant hyperplasia of the glandular structure as a result of chronic inflammatory activity in the vicinity of the glands. In no instance was obstruction of the duct of a gland observed. No cellular invasion of the alveoli was found. The lack of cellular infiltration in the alveoli and the ducts of the glands was in decided contrast to the condition of the crypts.

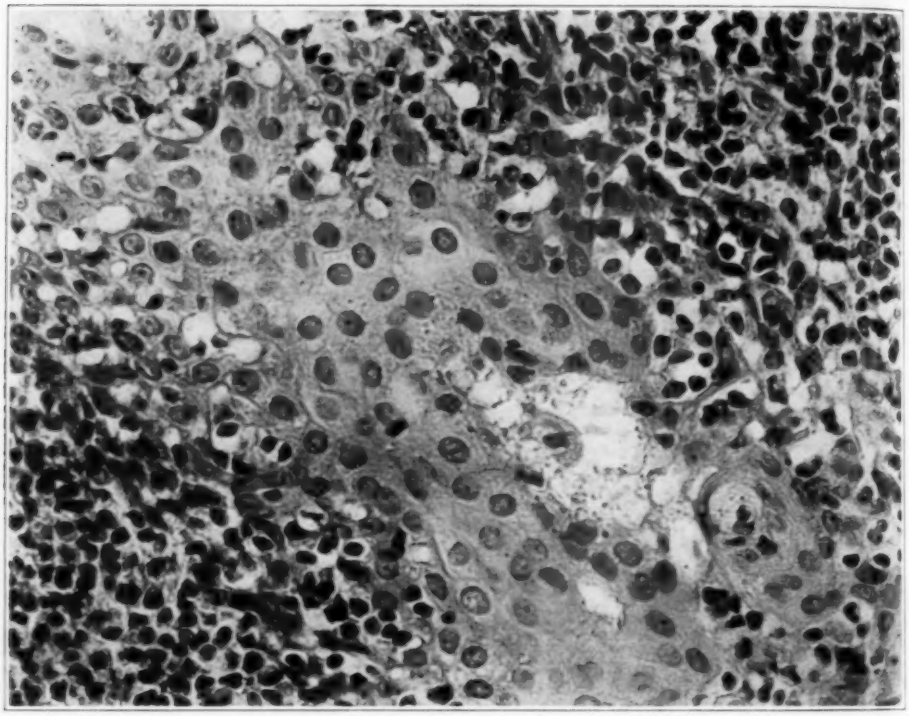


Fig. 18.—Section from a hyperplastic pharyngeal lymph node, showing groups of epithelial cells.

The group of epithelial cells shown in figure 18 within a hyperplastic pharyngeal lymph nodule represents an invagination of the surface epithelium and contains a lumen filled with amorphous débris and occasional desquamated cells. In sections in which the crypts are cut in cross-section, the lumen is readily distinguished, but frequently the section is so cut as not to show the lumen and many bizarre effects are produced. The cell nests may then be mistaken for epithelial pegs. If benign, such epithelial pegs are probably always irregular extensions of the epithelium of the crypt.

The formation of crypts was infrequently noted in the solitary lymph nodules of the posterior wall of the pharynx, but crypts were numerous

in the region of the lateral pharyngeal bands. The appearance of numerous crypts in the follicles of the posterior wall always accompanied hyperplasia of the lymph nodules and came to be regarded as an abnormality. The contents of the crypts varied greatly. At times there was merely amorphous débris, but more often the lumen of the crypt was filled with polymorphonuclear cells. Even when polymorphonuclear cells filled the lumen of a crypt, few could be found in the tissue surrounding the crypt. The thickness of the walls of the crypt varied from 10 to 15 cells near the surface to a single layer of cells in the deeper portions. In some instances the walls of the crypt were imperfect or denuded of epithelium.

COMMENT

Histologically, there was no specific alteration in the pharyngeal nodules in one type of disease which would differentiate them from the nodules occurring in another type of disease. Marked hyperplasia with chronic inflammatory change was the rule.

Since the cells of lymph nodules have not achieved a high degree of differentiation, they are prone to undergo mitosis and rapid proliferation when deleterious agents gather in the recesses of the nodule.[17] This rapid proliferation occurs early, and the increase in the number of polyblasts indicates a stimulation of or attraction for the reticuloendothelial units. Increase of the number of polyblasts in the central portions of a follicle gives the appearance of a false germinal center.

Edema occurs early, but later, when fibrosis is advanced, there is dilatation of the lymph channels due to obstruction and many of the dilated channels contain cellular elements, largely lymphocytes but also plasma cells and large mononuclear cells. Whether such cells can reach the superior deep and recurrential nodes and thence the trunk of the jugular vein and the subclavian veins is a matter for speculation. Obliteration of lymph channels seems invariably to result from sufficient proliferation of fibroblasts, but there is also proliferation of endothelial cells within the channels. Perifollicular lymph sinuses could be demonstrated even in specimens in which normal nodules closely approached the basement membrane of the epithelium; the perifollicular lymph spaces were obliterated by fibrosis in the abnormal nodules.

Hyperplasia of lymph nodules invariably appears to precede proliferation of fibrous tissue in chronic inflammation. The increase of young fibrous tissue elements is followed by a gradual and commensurate disappearance of lymph cells. Prior to the general dissolution of cells, the decrease in the number of lymph cells is coincident with and propor-

17. Delafield, F., and Prudden, T. M.: Text-Book of Pathology, ed. 11, Baltimore, William Wood & Company, 1919, p. 546.

tional to the increase in the number of polyblasts. Eventually, even the polyblasts disappear in the face of continued fibrosis.

In this series of abnormal pharyngeal nodules, plasma cells were not numerous. Only occasional eosinophils were found. Polymorphonuclear cells were sparse within the tissues, occurring in concentration only in the lumens of crypts. Newly formed endothelial cells occurred in the meshes of the reticular tissue between the blood vessels. It was frequently noted that margination of leukocytes had occurred in blood vessels adjacent to the crypts.

Infiltration of the fibrous tissue about the nodules first appeared on that border of the nodule which faced the epithelium; from this zone both the nodule and the epithelium became invaded. The terminal result of chronic inflammation of the nodule appeared to be a form of hyaline degeneration.

No Aschoff nodules were distinguished in the sections from patients with articular pain or choreiform manifestations, but these sections were of superficial tissue and therefore were not comparable to the sections of tissue obtained at autopsy by Fraser.[12]

If the various systemic effects observed in this series of patients are due to specific micro-organisms or to specific viruses, there is certainly no comparable specificity in the coincident alteration of the pharyngeal tissue.

CONCLUSIONS

Histologic sections of tissue from the pharynges of 108 patients with systemic disease and chronic pharyngitis invariably presented evidence of hyperplasia of the lymph nodules and chronic inflammation.

In these patients the histopathologic changes were common to all the types of disease studied; no specific histopathologic characteristic differentiated the pharyngeal nodules of patients with one type of disease from those of patients of the other groups.

THE CLINICAL SIGNIFICANCE OF COMPENSATORY GRANULAR PHARYNGITIS

HAROLD I. LILLIE, M.D.
ROCHESTER, MINN.

Complaints of unpleasant symptoms that are referable to the pharynx are perhaps the ones most frequently encountered in daily practice. The idea seems to be prevalent among many observers that all such symptoms are attributable to the secondary effect of disease of the paranasal sinuses, but I am firmly convinced that this idea is erroneous. My observations have led me to believe that the most frequent cause of pharyngeal complaints for which patients seek advice is referable to the pharynx itself.

Just prior to and for several years after the turn of the century much was written about the pharyngeal structures, and their symptomatology, pathology and physiology were thoroughly discussed. Earlier observers had described pharyngeal conditions under the inclusive term lymphatism. Although definite proof was lacking, there was a general feeling that the tonsillar tissue of the pharynx serves some useful purpose. Several theories as to the function of the tonsils have been suggested from time to time: (1) that they furnish protection against bacterial invasion, (2) that they function as glands of internal secretion, (3) that they are organs in which blood cells are formed, (4) that they are exposed lymph nodes, probably with a function of elimination or excretion and (5) that they produce antibodies. The choice of these theories was left to one's fancy. It seems highly probable, however, that the real function of the tonsils combines certain aspects embodied in all these theories.

It is known that the adenoid, pharyngeal and lingual tonsillar tissues develop embryologically from the submucous implantation of lymphocytes and that the palatine or faucial tonsils develop from the mesoderm of the second pharyngeal pouch. The faucial tonsil is the only portion of the tonsillar tissue that can be completely removed, and after its removal there is a tendency in certain cases for the lateral pharyngeal bands and tonsillar plaque in the pharyngeal wall to increase in size to a varying degree. In many cases this occasions unpleasant sensation in some to such an extent that the patient expresses the wish that the tonsils

---

From the Section on Otolaryngology and Rhinology, the Mayo Clinic.

Read at the Fifty-Eighth Annual Congress of the American Laryngological Association, Detroit, May 26, 1936.

had not been removed. It is to this group of patients that I purpose to confine my remarks. I look on the pharyngeal condition that follows the loss of the faucial tonsils as compensatory granular pharyngitis, meaning by this, of course, that in this group of patients the tonsillar tissue performs some unknown function and that nature compensates for the loss of the faucial tonsils by causing hypertrophy and hyperplasia of the remaining tonsillar tissue.

HISTOLOGIC AND PATHOLOGIC ASPECTS

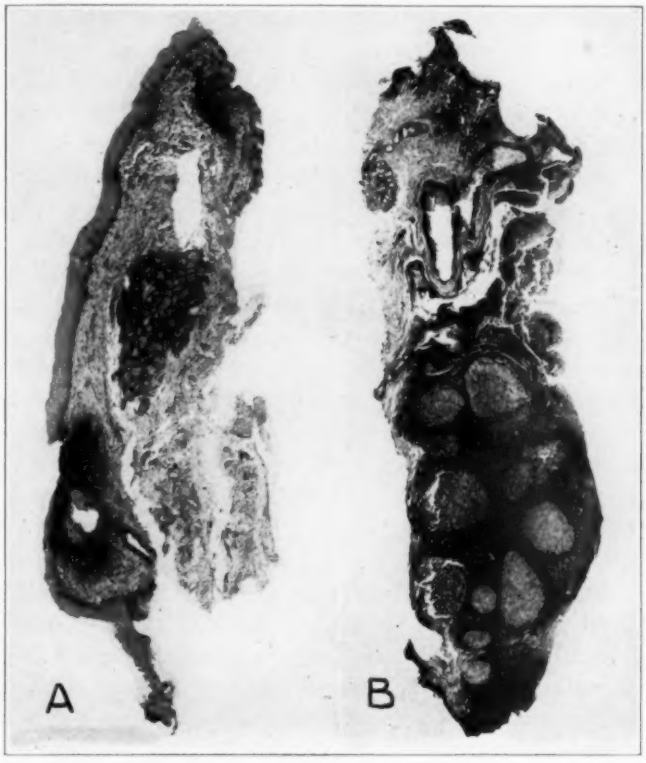
In addition to the faucial, pharyngeal and lingual tonsils, lymphoid tissue is distributed irregularly throughout the pharynx. In some areas, differing in extent and frequency in different persons, there are collections of lymphoid cells. Lymphocytes predominate in the surface epithelium and around the ducts of racemose glands. The glands on the posterior pharyngeal wall lie on or in the muscle layers under the connective tissue which separates them from the epithelium. The epithelium, which in embryonic life and in early infancy was ciliated, has long since lost its cilia as a result of metaplastic changes.

The epithelium in some places becomes thickened, the surface cells are cornified and there is a tendency for the epithelial cells to become more or less squamous. In other places atrophy occurs. The deposits of lymphoid cells around the ducts of glands, visible objectively as red raised areas, in contrast to the normal or atrophied areas of membrane, have an appearance described as granular. Depending on the degree of change (see the accompanying illustrations), the small blood vessels become engorged, the glands become dilated and the more active cells of the glands become granular. The efficiency of the glands is so disturbed that the nature of their secretion is changed. Air currents cause rapid evaporation of this vitiated secretion, and the tendency to form clumps of mucus is manifest. The pharyngeal membrane is in reality, then, in a state of congestion and disturbed function.

SYMPTOMS

The patient may complain of a constantly sore throat or that his throat aches, especially when he is fatigued. The sensation of a foreign body in the throat is common. Perhaps the most distressing symptom is the collection of mucus in clumps, particularly in the morning; these clumps are difficult to remove and cause hawking, gagging and severe paroxysms of coughing. The frequent desire to swallow and interference with the use of the voice are noticed particularly by public speakers and singers. The patient becomes "pharynx conscious" and notices every change in sensation. That he is very uncomfortable he will readily admit.

Clinically it is often possible to anticipate the occurrence of pharyngeal symptoms after the removal of infected tonsils and adenoids of children or the faucial tonsils of adolescent boys and girls or adults. The inclusive and descriptive term lymphatism may well be chosen for this particular group of patients. They usually are red-headed or light-complexioned, have thin skins and sensitive mucous membranes and are subject to frequent attacks of infection of the upper respiratory tract; often they are considered below par physically. Not infrequently



A, normal pharyngeal membrane. *B*, granular pharyngeal membrane.

close questioning reveals that the diet consists mostly of carbohydrates and that meat and the fats of meat are purposely avoided. How the idea that the fats of meat should be rigidly avoided gained such general acceptance is difficult to explain, as it is known in animal husbandry, for example, that a balanced diet is essential in conditioning animals for the market and in influencing the production of animal by-products. The general hygienic background of these patients may be faulty from many standpoints, and occasionally in the case of children it is apparent that the parents have been oversolicitous in their care and management.

On examination of the throat the tonsils are usually found to be large, soft and red, and many of the crypts contain débris or caseous plugs. The cervical lymph nodes are palpable. The lateral pharyngeal bands are enlarged and red and have a granular appearance, with a tendency to superficial dryness. The enlargement extends well up toward the fossa of Rosenmüller. The pharynx has a red, raised granular appearance, and there is evidence of some tendency to follicular formation; the crypts of the follicles occasionally contain caseous plugs, or, if the crypts are not open, little submucous abscesses are seen. In this particular type of case if the faucial tonsils need to be removed because the patient has had frequent attacks of follicular tonsillitis with cervical adenitis or if as a result of chronic tonsillitis focal infection has developed, there is a question as to the advisability of immediate removal of the tonsils because of the probability of the development of intractable granular pharyngitis. The clinical examination of adolescent children and adults may not reveal such a marked tendency toward hypertrophy of lymphoid tissue in the pharynx because of the natural tendency for retrogression; the experienced observer, however, will note that the pharynx looks somewhat roughened. The lateral pharyngeal bands are enlarged, although not particularly so. The posterior pharyngeal wall may not show any particular changes except that the color is not normal and here and there lymphoid follicles may be seen. In the type of case in which it is necessary to remove the tonsils for definite reasons, a preoperative course of medication may control the pharyngeal condition. If the condition can be brought under control, the patient's tendency to pharyngeal symptoms need not deter one from advising operation.

Unpleasant sensations may develop in the nasopharynx soon after removal of the tonsils, or they may appear after some subsequent infection in the upper portion of the respiratory tract. From then on the patient will be aware of unpleasant symptoms referable to the pharynx. In some instances the occurrence of this secondary type of granular pharyngitis becomes of importance from the standpoint of focal infection.

TREATMENT

In the past the treatment of granular pharyngitis has consisted of the topical application of certain drugs or combinations of drugs or of the use by the patient of alkaline sprays and gargles (colored to suit the particular whim of the physician or the patient); usually this form of treatment has brought about no subjective relief or change in the general appearance of the pharynx. The use of roentgen rays has been advised, and in some instances such treatment has been followed by the addition of new symptoms to the old. If roentgen therapy has been

effective, however, the glandular elements have usually been destroyed, and the pharynx has become dry. Diathermy and electrocoagulation have been used to eliminate certain definite follicles and enlargement of lateral pharyngeal bands. This causes a definite objective change, but it usually does not eliminate the symptoms. Surgical removal of the lateral pharyngeal band or the numerous follicles on the pharynx is difficult and usually results in hypertrophy and hyperplasia of the remaining follicles. The application of silver nitrate in solutions of various strengths has long been a favorite method of treatment. It may relieve the symptoms temporarily by producing coagulation of the surface epithelium or mild scarring. In some cases, however, the patient himself has used silver nitrate to the point where general argyria has developed.

All in all, it can be said that the topical application of remedies to the pharynx to relieve granular pharyngitis has been disappointing.

In the past some attention has been paid to general treatment for the relief of granular pharyngitis, probably on an empirical basis. Syrup of hydriodic acid or some such preparation has been used, and in certain instances beneficial results have been obtained, particularly in the case of children. The rationale of this type of treatment probably has been stimulation of the secretion of the racemose glands in the pharyngeal wall through the sympathetic nervous system. I am told by competent pharmacologists that the actual pharmacologic action of iodine or the iodides is not known. Iodine is said to be an alterative. In any event, beneficial effects on the condition of the pharynges from the ingestion of iodides have been noted in adolescent children and adults.

At present the treatment that I prefer for granular pharyngitis is the administration of iodides by mouth in some such convenient form as ethyl di-iodobrassidate over a necessary period. It may be administered before operation in cases in which it is suspected that granular pharyngitis will develop. The preparation comes in tablet form, it is palatable and apparently the organic composition is such that the unpleasant symptoms associated with the ingestion of iodine are to a large extent eliminated. The tablets are chewed and swallowed. At present, depending on the degree of involvement, 1 tablet is given from two to four times a day for a period of five days, the amount being lessened as the symptoms ameliorate. This drug may be given to children, although syrup of hydriodic acid seems to have a similar effect if given over a longer period of time.

This method of treatment has given patients more relief and caused more definite changes in the appearance of the pharynx than any other remedy that has yet been used. There are many preparations of iodine on the market that are useful for this type of medication. Certain persons who have been greatly relieved of the symptoms of granular

pharyngitis by the ingestion of iodides in this form have found that they can tell by the sensations in the pharynx just when the medication is indicated and how long they need to continue it. The cold weather months, because of the added load on the respiratory membrane in carrying on its function, seem to be the time when the need for such medication is noticed most.

SUMMARY

There is a type of granular pharyngitis seen in certain persons after the removal of infected tonsils that may be looked on as compensatory. When it occurs it causes unpleasant symptoms. The best method of treatment that has yet been found is the ingestion of iodides on an empirical basis. The results have been satisfactory, and continued use will be made of this method of treatment.

FREQUENCY AND EFFECT ON EUSTACHIAN TUBE OF RESIDUAL LYMPHOID TISSUE IN THE NASOPHARYNX

DUNBAR ROY, M.D.
ATLANTA, GA.

That the lymphoid tissue in the nasopharynx occasionally involves the eustachian tube, both by its blocking effect and by its being the source of infection for the middle ear, is well recognized. This, in my opinion, accounts for the lessened frequency of involvement of the middle ear since there has been such universal removal of tonsils and adenoid tissue.

The symposium today does not include a consideration of conditions of this type but of the cases in which operation has previously been performed and remnants of this lymphoid tissue either still remain around the nasopharyngeal opening of the eustachian tube or have undergone compensatory increase in size. These compensatory enlargements Dr. Alexis Carrel has denominated as adaptation of tissues, such as occurs when the removal of one kidney is followed by the enlargement of the remaining organ in its effort to take care of the urinary secretion. Dr. Abel, of the Johns Hopkins University School of Medicine, has also called attention to the occurrence of the same phenomenon after the removal of one adrenal gland.

Lymphoid tissue which obstructs the mouth of the eustachian tube is most frequent in the very young, and it is in these children that thorough inspection of the nasopharynx is most difficult. Whether or not lymphoid tissue actually occurs in the eustachian tube has by no means been settled.

In 1875 Gerlach reported a postmortem study of the ear and eustachian tube of a child 6 months old, in which he observed numerous lymph follicles in the cartilaginous portion of the tube, extending from the pharyngeal orifice to the isthmus. He suggested that this lymphoid structure might be called a tubal tonsil. Since that time numerous authors have referred to this lymphoid structure as Gerlach's tonsil.

In 1877 Teutleben reported on a study of the tubal tonsil in adults. In the cases studied only traces of lymphoid tissue of the pharyngeal tonsil persisted, but when any such lymphoid tissue was present it

Read at the Fifty-Eighth Annual Congress of the American Laryngological Association, Detroit, May 25, 1936.

extended into the eustachian tube. Teutleben described three types, or stages, of infiltration of lymphoid tissue into the eustachian tube. First, the lymphoid tissue infiltrated the mucosa in narrow bands; second, small projections of the mucosa were pushed upward by infiltration of the adenoid tissue, which represented a modification of a single lymph follicle and, third, these collections of adenoid tissue were larger and there was infolding of the mucosa that covered them. From a study of these cases this author stated that lymphoid tissue is not always present in the eustachian tube of adults and may be present in very small amounts.

Lucas, in an article published in 1899, stated that it should be remembered that the eustachian tube contains lymphoid tissue which may become hypertrophied.

In 1900 Anton reported the postmortem study of the lymphoid tissue in the eustachian tube in thirty-five specimens from patients of all ages. He concluded that the pharyngeal tonsil reaches its greatest development at the age of from 5 to 15 years, while lymphoid tissue of the eustachian tube shows its greatest development at the age of from 1 to 2 years and begins to recede with increasing years.

T. H. Halsted, in an article published in 1926 dealing with the pathologic structure and surgical treatment of the eustachian tube, stated: "In children particularly, inflammation and infection of the lymphoid tissue within the eustachian orifice and about the posterior tip, in Rosenmueller's fossa, is a very frequent occurrence, and occasions acute tubal inflammation."

In 1920 Roure stated that at the pharyngeal entrance of the eustachian tube the tonsil of Gerlach constitutes a barrier against bacterial invasion. It is difficult for one to understand such a statement in the light of clinical experience.

Errecart in 1933 noted that permanent obstruction of the eustachian tube may result from persistence of the tonsils of Gerlach.

In 1933 Zöllner, in an extended article, stated that Citelli observed lymphoid tissue in the eustachian tube in considerable amount only in children and that normally it recedes with advancing age in the same way as the adenoid tissue of the nasopharynx. In adults a small amount of lymphoid tissue may be present in the lower border of the pharyngeal orifice of the tube, but any more extensive growth of lymphoid tissue in the tube at this period must be regarded as pathologic. Zöllner examined sections from the ear and eustachian tube in seventeen cases in which there was disease of the ear. His observations led him to agree with Citelli in regard to the pathologic significance of lymphoid tissue in the eustachian tube.

In the seventeen cases in Zöllner's series (all in adults) a small amount of adenoid or lymphoid tissue was noted at the orifice of the

eustachian tube in three instances—all of otitis media. In another case a considerable amount of adenoid tissue was observed at the orifice of the tube. In two cases considerable lymphoid tissue was noted farther up in the eustachian tube near the isthmus. Strange to say, Zöllner attributed this proliferation of lymphoid tissue to extension of suppuration from the tympanic cavity rather than from the nasopharynx.

In 1934 Dorothy Wolff, of the medical department of the Washington University School of Medicine, on the basis of a study of twenty-five specimens of the eustachian tube, made the following statement: "A tubal tonsil (lymphoid nodule) may occur in the pharyngeal end of the tube . . . in a 6-months old infant." She made no mention of the presence of lymphoid tissue in specimens from adults.

In a personal communication, Dr. Barnhill, who has made many observations in the anatomic dissection of these parts, stated that he had frequently noted masses of lymphoid tissue in Rosenmüller's fossa, even after supposedly thorough removal of the adenoid tissue, and occasionally also around the bulbous extremity of the tube but that he had never seen lymphoid tissue in the tube itself. According to Barnhill and contrary to the opinion of other anatomists, the walls of the eustachian tube are not in contact.

In a number of cases, by means of the nasopharyngoscope, I have found lymphoid tissue apparently in the mouth of the tube itself—and this usually several years after removal of tonsils and adenoids. I mean by this tissue not the gelatinous polypoid mass which is frequently seen in the mouth of the tube and which can be removed by suction through the eustachian catheter but real lymphoid tissue.

I believe that in the rapid routine of office practice the physician too often fails to make a thorough examination of this part of the nasopharynx and that for this reason one is sometimes surprised at not obtaining the desired results from inflation with the catheter. The presence of this tissue is undoubtedly due to failure to remove thoroughly the adenoid tissue at the time of operation. Most surgeons have been inclined to perform adenoidectomy too rapidly, without attempting to remove every vestige of this lymphoid tissue. Bleeding must cease; the soft palate must be retracted, and Rosenmüller's fossa must be inspected before one is certain that a thorough operation has been completed. In my experience, palpation with the finger is an uncertain diagnostic procedure, although advocated by some laryngologists. Many examiners have seen particles of lymphoid tissue left after operation, which in a few years result in the return of the adenoids, and one is faced with the necessity of advising a second operation.

The second question refers to the effect of this lymphoid tissue on the eustachian tube, if it is present around or even in the mouth of the tube, whether as the result of incomplete operation or as particles which have been present since birth.

This question would involve a large field for discussion if one were to consider the various ramifications of aural involvement in its relationship to the eustachian tube. Only two points will be considered.

It is recognized that inflammatory swelling and infection of the mucous membrane of the tube occur through extension of inflammation from the contiguous lymphoid tissue. That the tubal inflammation occasionally remains localized is recognized, but too frequently it extends into the middle ear. These remnants of lymphoid tissue are often the seat of folliculitis such as is observed in the faucial tonsils. This is one of the reasons that pediatricians are often puzzled by the presence of fever, stoppage of the nasal cavities and enlargement of the submaxillary glands in cases in which there has been supposedly thorough removal of the adenoid tissue and the pharynx shows no abnormality. Such a condition cannot be diagnosed by palpation, and only in a few cases can the postnasal mirror be used. Clinically, however, the symptoms are characteristic.

These remnants are most pronounced in Rosenmüller's fossa and may extend around the tubal orifice. This is the reason that parents are surprised at involvement of the middle ear after the removal of the tonsils and adenoids.

The third question which I wish to consider briefly is the method of treatment which is most applicable to this condition.

When there are distinct masses in Rosenmüller's fossa and large lateral bands of the same tissue extending into the nasopharynx, complete surgical removal must be the only method of treatment. When, however, this lymphoid tissue, whether in children or in adults, is prominent only around or within the tubal orifice, the management of such a condition is more difficult.

I have never seen a surgical instrument which satisfactorily removes this tissue without a possibility of injuring the tube itself. I cannot agree with Halsted, who stated that curettement of the lymphoid tissue can be done with a Holmes ring curet or with sharp biting forceps under direct ocular inspection. Such procedures may cause irreparable damage to the tube itself, and they are difficult of performance. Halsted also advocated the use of the galvanocautery.

Hurd in 1931 advocated the removal of this tissue by electrocoagulation, using variously shaped insulated active electrodes, with pointed or dull tips. After considerable experience with the use of the different surgical methods, I have found that the method most satisfactory in

my hands is the destruction of this tissue located around and inside the tubal orifice by means of chemical cauterization. My method is as follows:

On one end of a Yankauer tubal wire a small piece of cotton is tightly wound. This end is saturated with a deliquescent solution of tri-chloracetic acid and passed through a hard rubber eustachian catheter. The catheter is then placed against any small particle of lymphoid tissue around and inside the tubal orifice, and the application is made by pushing out the wire, under inspection with the nasopharyngoscope on the other side. Such applications can be made at intervals of ten days or two weeks.

While such a method is slow, it is safe and will finally destroy small particles of lymphoid tissue at these points. I frequently alternate this procedure with the employment of pure tincture of iodine, which is especially useful if one wishes to pass the wire still farther up into the tube. It should be borne in mind that such treatment is not applicable to large masses of residual lymphoid tissue.

I believe that many aural conditions could be permanently benefited if every laryngologist considered more frequently the possibility of the presence of lymphoid tissue in and around the nasopharyngeal opening of the eustachian tube.

BIBLIOGRAPHY

Anton, W.: Studien über lymphatische Gewebe in Tuba Eustachii beim Kinde, Prag. med. Wchnschr. **25**:588, 1900.

Breeding, E. G.: The Eustachian Tube: Its Relation to Nasopharyngeal and Middle Ear Diseases, South. M. J. **24**:882, 1931.

Citelli, S.: Struttura della tromba d'eustachio nell' nomo, Arch. ital. di otal. **16**:404 and 408, 1904.

Delpech, P.: L'audition chez les adénoïdiens non otitiques, Thèse de Paris, no. 95, 1909.

Errecart, P. L.: Obstruction permanente de l'orifice pharyngien de la trompe d'Eustache, Rev. de laryng. **54**:599, 1933.

Gerlach: Zur Morphologie der Tuba Eustachii, Monatschr. f. Ohrenh. **9**:49, 1875.

Guthrie, D.: Eustachian Tube: Significance in Otology, Edinburgh M. J. **24**: 405, 1920.

Halsted, T. H.: Pathology and Surgery of the Eustachian Tube, with Reference to the Value of Closing It, Arch. Otolaryng. **4**:189 (Sept.) 1926.

Hays, H. M.: The Recurrence of Tonsils and Adenoids, M. Times **49**:167, 1921.

Hill, F. T.: Observations Following Adenoidectomy, Arch. Otolaryng. **14**:775 (Dec.) 1931.

Hurd, L. M.: The Use of Surgical Diathermy About the Mouth of the Eustachian Tube for Infection and Catarrh of the Middle Ear, Ann. Otol., Rhin. & Laryng. **40**:13, 1931.

Lucas, R.: Des végétations adénoïdes et leurs rapports avec les affections de l'oreille, Thèse de Paris, no. 45, 1898.

Moore, I.: The Tonsils and Adenoids and Their Diseases, London, William Heinemann, Ltd., 1928.

Randall, B. A.: The Clinical Anatomy of the Eustachian Tube, Tr. Am. Otol. Soc. **7**:423, 1900.

Roure, F.: La trompe d'Eustache, Paris, Norbert Maloine, 1920.

Simpson, G. A. G.: Adenoid Growths of the Naso-Pharynx, London, J. Bale, Sons & Danielsson, 1904.

Teutleben, E. V.: Die Tuben-Tonsille des Menschen, Ztschr. f. Anat. u. Entwcklngs-gesch. **2**:298, 1877.

White, J. V.: Causes of Failures in Adenoidectomies, New York M. J. **92**:467, 1910.

Wingrave, W.: Adenoids, London, Baillière, Tindall & Cox, 1904.

Wolff, D.: The Microscopic Anatomy of the Eustachian Tube, Ann. Otol., Rhin. & Laryng. **43**:483, 1934.

Zöllner: Die Ohrtrompete bei akuter und chronischer Mittelohreiterung, Ztschr. f. Hals-, Nasen- u. Ohrenh. **34**:30, 1933.

Clinical Notes

MEASUREMENTS OF THE TEMPERATURE OF THE MAXILLARY SINUS AFTER TREATMENT BY VARIOUS METHODS OF HEATING: A COMPARATIVE STUDY

M. A. Andreen, M.D., and S. L. Osborne, B.P.E., Chicago

No one doubts any longer that heat can be produced in human tissues by means of the proper apparatus. The greatest progress in this direction has been made by means of the high frequency field. The rise in temperature and the area heated are dependent on many factors, such as the amount of energy delivered to the patient, the size of the electrodes, the time of application, the efficiency of the circulation and the nature of the tissues subjected to the high frequency field. Within recent years much interest has been shown regarding the therapeutic value of heat in infection of the nasal sinus. Without evidence it has been accepted as a fact by many that all the appliances used were of definite therapeutic value because of the heat produced in the infected tissues of the nasal sinuses. Agents other than the high frequency field have been used. These employ the infra-red rays of various wavelengths. Unfortunately, the quality and quantity of the various wave bands found in the distribution curve for energy from the various sources have not been given much consideration. A review of the literature has shown that few actual measurements have been made to determine whether the infected area was actually heated. Gale [1] attempted to measure the temperature of a nasal sinus having a permanent opening. After a treatment with short wave diathermy, he found that the temperature in the sinus had risen from 98.5 to 99 F. He stated, however, that because of mechanical difficulties he was unable to get the thermometer in touch with the wall of the sinus. Tebbutt [2] has recently presented a paper giving the results of his excellent scientific research. He reported fifteen carefully controlled experiments made on three patients. These patients had been operated on, and the sinuses were clean, with a slightly thickened membrane. He took measurements after the use of an ice bag, cold compresses, radiant heat and a high frequency oscillator operating at a frequency of from 9,000 to 12,000 kilocycles, using an air condenser field. With two exceptions he found that these agents produced no change of temperature in the maxillary and the sphenoid sinus. The two exceptions were noted when the infra-red rays and the high frequency field were used. He was surprised to find not a rise as he had anticipated but a drop of approximately 1 F. Tebbutt's measurements were carefully and accurately made by means of a sensitive thermopile. Recently, much attention has been

From the Departments of Otolaryngology and Physical Therapy of the Northwestern University Medical School.

1. Gale, Conrad K.: The Use of Ultra Short Waves in Sinus Therapy, Laryngoscope **45**:520 (July) 1935.

2. Tebbutt, Harry K., Jr.: Effect of Physical Agents on the Temperature of the Nasal Sinuses, Arch. Otolaryng. **22**:733 (Dec.) 1935.

given to the so-called selective heating of short wave ultra high frequency current. Eidinow [3] and Mortimer and Osborne [4] have shown that short wave diathermy has no selective action on living tissues. Selective heating is an ideal that may be but has not yet been consummated.

About a year ago we decided to make some measurements of the temperature of the antrums after the use of diathermy, short wave diathermy, the electromagnetic field, infra-red rays, the compsolite, the Cutler water-cooled infra-red lamp and the Elliott apparatus for treatment with hot water. With the exception of the Cutler water-cooled infra-red lamp, these appliances are used by many practitioners for the application of heat to the sinuses. Because of the lack of information as to how much heat is obtained in the tissues of the antrum, this problem was undertaken. It is not a clinical evaluation of these methods.

Our measurements were made by means of thermocouples. The thermocouple was made of a single strand of no. 26 copper wire coupled with a strand of no. 26 constantan wire. The sections of wire to be used in the antrum were carefully enameled and baked at a high temperature. The constant temperature junctions were placed in a quart thermos bottle and immersed in crushed ice. The bottle was closely corked with a rubber stopper, and care was taken to prevent air pockets. The hot junction was calibrated against a thermometer certified by the Bureau of Standards. The thermocouples were connected to a Leeds and Northrup portable potentiometer for registering the thermo-electric voltage. The thermocouples showed a sensitivity of 0.0255 millivolt per degree Fahrenheit. They were calibrated over the range from 110 F. to 90 F.

The following technic was used: The inferior meatus was packed with a cotton pledget soaked in a 10 per cent solution of cocaine hydrochloride, which remained in contact with the lateral nasal wall for thirty minutes. A hard rubber cannula had been constructed which fitted a Coakley trocar, and it was inserted into the antrum in the usual manner after sufficient cocainization of the area, after which the cannula was left in situ. The thermocouple was then inserted into the antrum through the cannula, the end of which was placed in apposition with the wall of the antrum, after which the readings were noted.

Seventeen patients were used in the fifty-four experiments. Taking into consideration the type of patient selected and the technic used, we feel that our results are accurate, as there had been no surgical intervention, and therefore the structure of the antrum was a close approximation to that of the average person. In cases in which an exenteration or a window resection has been done, the sinus merely becomes a part of the nasal cavity, and any heat which may be generated is dissipated much more rapidly than if the walls were intact. Furthermore, after surgical intervention there would naturally be some interference with the circulation of blood and lymph, which is not present when no operation has been done. For these reasons, then, we decided to eliminate from our observations the patients whose sinuses had been operated on. Our use of a cannula necessitated local anesthesia, but we allowed sufficient time to elapse before recording the initial temperature. The cannula would frequently become quickly plugged with mucus, which served as a stopper and left only the natural orifice, which would have to be contended with in any case. Each patient had active infection, subacute or chronic, in one or both antrums. Fluid was present in

3. Eidinow, Albert: Discussion on Short-Wave Diathermy, Proc. Roy. Soc. Med. **28**:307 (Jan.) 1935.

4. Mortimer, Bernard, and Osborne, Stafford L.: Tissue Heating and Short Wave Diathermy: Some Biologic Observations, J. A. M. A. **104**:1413 (April 20) 1935.

many cases. The diagnosis was based on symptoms, roentgenograms and material obtained by washing the antrum. These data are given in table 1.

Readings were made until the temperature became stabilized, and this frequently required a period of from thirty to forty-five minutes. When the temperature had remained stable for some time, the experiment was started. While using the high frequency field, it was necessary to remove the thermocouple during the experiment, but at the termination of the treatment it was quickly reintroduced with a minimum loss of time. It was necessary to duplicate this procedure in the case of the Elliott hot water treatment. In all other experi-

TABLE 1.—*Physical Findings in Patients*

Patient	Symptoms	Roentgenogram	Material Obtained by Washing the Antrum
1	Purulent discharge from right side; pain in right side of head	Right antrum cloudy	Mucopurulent
2	Nose frequently blocked with mucus; chronic cold	Right antrum cloudy	Mucopurulent
3	Chronic nasal discharge and frequent pains between the eyes	Both antrums cloudy	Pus in both antrums
4	Pains over both antrums especially the left; chronic nasal discharge	Left antrum cloudy; thickened membrane on right	Pus in left antrum; right clear
5	Mucopurulent nasal discharge; occasional pain on the left side	Left antrum cloudy; thickened membrane on right	Pus in left antrum; right clear
6	Frequent nasal blockage with mucus; headaches	Both antrums cloudy	Pus in both antrums
7	Sense of fulness and pain over left antrum	Thickened membranes in both antrums	Clear in both antrums
8	Serous discharge from right side for three days	Right antrum moderately cloudy	Clear
9	Chronic bilateral purulent nasal discharge; pain over both antrums and around the eyes	Both antrums cloudy	Pus in both antrums
10	Purulent discharge from left side of nose	Left antrum cloudy	Pus in left antrum
11	Headaches; nasal discharge	Thickened membranes both antrums	Pus in left antrum
12	Nasal discharge and crusting	Left antrum cloudy	Clear
13	Nasal discharge; pains in right side of head	Right antrum cloudy	Mucopurulent
14	Frequent nasal discharge and obstruction	Thickened membranes both antrums	Both clear
15	Pain in left side of head	Left antrum cloudy	Mucopurulent
16	Frequent nasal obstruction and discharge	Left antrum cloudy; right antrum thickened	Right clear; pus in left
17	Headaches; pain in temporal and ethmoid sinuses	Antrums and ethmoid sinuses cloudy	Both clear

ments the thermocouple was left in place during treatment whenever possible. Care was taken to protect wires of the thermocouple from external sources of heat. We found, however, that these precautions were apparently not necessary. After the experiments with the Elliott apparatus readings of the temperature were made for ten consecutive minutes to rule out any possible heating of the cannula, the end of which came in contact with the heated nasal applicator. At the end of this period the temperature either had become stabilized or had returned to its original level. In this way we were able to rule out a possible source of error. We found in all experiments that whatever final temperature was secured was usually maintained for several minutes.

We believe that the final temperature attained by the apparatus is the best index of its value as a heating medium. Using the final temperature as a basis

for our comparison, we found that the electromagnetic field and ordinary diathermy made the best record. Both finished with an average final temperature of 99.1 F., diathermy starting with an average initial temperature of 98.2 F. and the electromagnetic field starting from 98.5 F. Six observations were made with diathermy and nine with the electromagnetic field (table 2). We used a well constructed low voltage portable diathermy generator for the experiments with diathermy. The usual technic was used, except that we used a special fenestrated active electrode. The dose was gaged by the tolerance of the patient and ranged between 525 and 750 milliamperes. Treatment was given for twenty minutes. The electromagnetic generator had a frequency of between 12,000 and 14,000 kilocycles. Application was made by means of a small double pancake coil. The coil was placed over each antrum but not in actual contact with the skin. The dosage was determined by individual tolerance. The highest final temperature of the entire series, 100.2 F., was reached by this method (table 2). Treatments lasted for twenty minutes.

Next in order was the heat from the infra-red rays from a thermospectral lamp. The apparatus consists of a 1,000 watt tungsten filament, nitrogen-filled incandescent light bulb placed in a parabolic reflector so as to produce parallel rays to prevent focal hot spots. The predominant band of infra-red rays ranged between 9,000 and 11,000 angstroms. Seven experiments were made, and an average final temperature (table 2) of 99 F. was obtained from an initial average of 98.1 F. The maximum temperature secured was 99.8 F. The lamp was placed so that the rays fell at a right angle to the face. The patient's eyes were protected from the glare of the light. The thermocouple was taken out during the experiment, and the end of the cannula was protected from the heat. Twenty minute treatments were given.

The Cutler water-cooled lamp came next, producing an average final temperature of 98.9 F. This lamp was made essentially for diagnostic purposes and was not therefore an ideal design for this particular work. The lamp consists of a 750 watt bulb enclosed in a casing with a continuous stream of water passing in front of the bulb in such a manner as to absorb the longer band of infra-red rays. For this reason, theoretically this should be an ideal method of introducing the deeper-penetrating, shorter infra-red rays into the tissues. The orifice of the lamp, 2 inches (5 cm.) in diameter, was held in contact with the treated area during seven of the experiments and 2¼ inches (5.6 cm.) distant in four others. In all, eleven experiments were made. The treatment was applied for twenty minutes.

The compsolite was a poor fourth, with an average final temperature of 98.6 F. (table 2) from an initial average of 98.5 F. In accordance with instructions from the manufacturer, however, we gave only nine minute treatments. The compsolite consists essentially of a specially constructed bulb which supposedly gives light waves which are a close approximation to natural waves from the sun. The light is transmitted through special quartz applicators, so constructed that the light may be directed in any desired direction. The hard palate at the base of the antrum was treated for four and one-half minutes, and a similar period of treatment was given to the outside area. Eight experiments were made.

Short wave diathermy was next in order. A 16 meter standard short wave generator was used for the seven experiments. The electrodes consisted of the usual rubber-covered condenser plates. The active electrode, 2 by 4½ inches (5 by 11.2 cm.), was placed over the antrum, and the dispersive electrode 6 by 8 inches (15 by 20 cm.), over the dorsal region. It was necessary to place felt

TABLE 2.—*Complete Experimental Data*

Subject	Temperatures, Fahrenheit			Averages			Final Record	
	Initial	Final	Change ±	Initial	Final	Change	Low	High
			Diathermy					
9	99.4	100.1	+0.7					
9	99.3	99.8	+0.5	98.2	99.1	0.9	98.9	100.1
13	98.2	99.4	+1.2					
15	97.3	99.3	+2.0					
2	97.8	99.3	+1.5					
4	97.3	98.9	+1.6					
			Electromagnetic Field					
9	99.3	100.2	+0.9					
2	99.2	100.0	+0.8					
9	99.3	99.6	+0.3					
6	96.9	99.5	+2.6					
2	99.1	99.4	+0.3					
10	97.8	99.2	+1.4	98.5	99.1	0.6	98.5	100.2
4	98.2	99.0	+0.8					
2	97.7	98.6	+0.9					
4	98.9	98.5	−0.4					
			Thermospectral Lamp					
9	99.3	99.8	+0.5					
15	98.7	99.8	+1.1					
8	98.5	99.2	+0.7					
2	97.8	98.9	+1.1					
12	97.2	98.7	+0.5	98.1	99.0	0.9	97.8	99.8
15	98.2	98.6	+0.4					
4	97.0	97.8	+0.8					
			Cutler Water-Cooled Lamp					
4	99.2	99.8	+0.6					
9	99.3	99.7	+0.4					
9	99.6	99.4	−0.2					
8	99.2	99.4	+0.2					
10	98.9	99.3	+0.4	98.5	98.9	+0.4	97.9	99.8
8	98.8	99.7	+0.3					
16	98.3	98.7	+0.4					
6	97.3	98.3	+1.0					
4	97.3	98.2	+0.9					
10	98.3	98.9	+0.6					
16	97.5	97.9	+0.4					
			Compsolite					
5	99.4	99.7	+0.3					
11	99.0	99.0	0.0					
2	98.8	98.8	0.0					
3	98.6	98.6	0.0					
14	98.6	98.6	0.0	98.5	98.6	0.1	97.3	99.7
17	98.2	98.5	+0.3					
12	97.8	97.8	0.0					
6	97.5	97.3	−0.2					
			Short Wave Diathermy, 16 Meters					
9	100.1	100.0	−0.1					
9	99.4	99.7	+0.3					
7	98.6	99.2	+0.6	98.1	98.4	0.3	97.0	99.7
15	97.8	98.0	+0.2					
15	97.7	97.7	0.0					
15	96.1	97.0	+0.9					
15	97.3	97.0	−0.3					
			Elliott Treatment					
2	98.5	99.0	+0.5					
1	97.7	98.6	+0.9					
13	97.7	98.4	+0.7	97.8	98.3	0.5	97.9	99.0
13	97.8	98.1	+0.3					
1	97.8	98.0	+0.2					
1	97.2	97.9	+0.7					

½ inch (1.25 cm.) thick and a bath towel between the skin and the electrode. We found it impossible to maintain the full resonance of the circuit and at the same time to give a dose tolerated by the patient. The uncomfortable high surface temperature beneath the condenser plates seemed to be a limiting factor with these machines at the time of the experiment. It seems to us that the poor showing is undoubtedly due to the inability of these generators to operate at full capacity throughout the treatment. One cannot, however, afford to risk a burn in the region of the face.

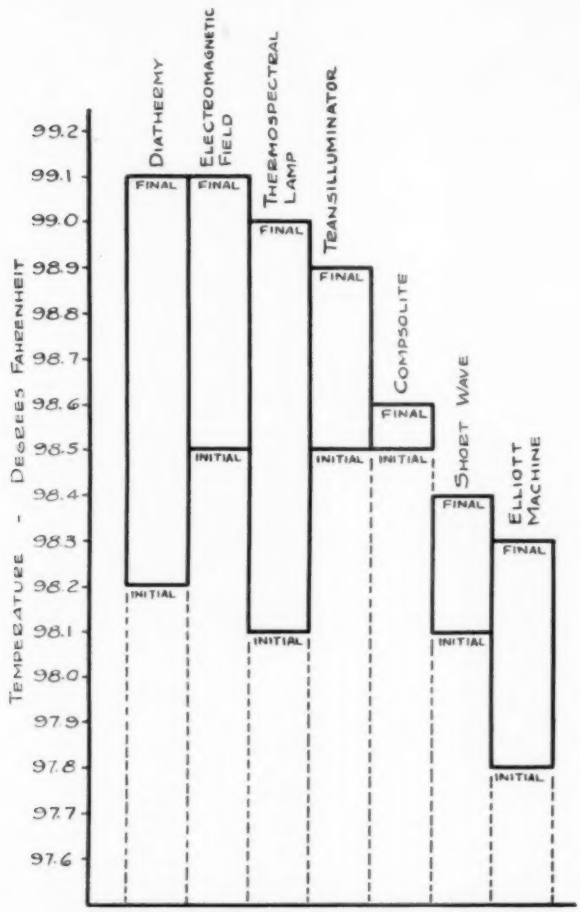


Chart. 1.—Average initial temperature, average increase and average final temperature obtained by various methods.

The lowest average final temperature was obtained with the Elliott apparatus. This is essentially a hot water circulating system. The heated water is forced through a rubber hose to a specially shaped rubber applicator and returned to the tank. The water was maintained at a temperature of 130 F. during the treatment, which was given for forty-five minutes in our experiments. This is considered the correct time for treatment. Six experiments were made, and

an average final temperature of 98.3 F. was reached, from an initial average of 97.8 F. (table 2). After each treatment a cooling curve was obtained by taking readings every minute for ten consecutive minutes. Chart 2 illustrates a typical cooling curve and also shows evidence that the cannula was heated, for the temperature fell 0.8 F. in the first five minutes. Chart 1 shows graphically the average initial temperature, the average increment of temperature and the average final temperature obtained by the various methods. Table 2 is the complete protocol of all the experiments.

In four of our experiments we found a slight drop in temperature, of between 0.2 F and 0.4 F. (table 2). Tebbutt [2] reported similar findings, although the drop was greater, amounting to 1 F. The methods we used did not produce high temperatures. We do not believe that treatment of longer duration would essentially change these records. It may well be that the benefits received

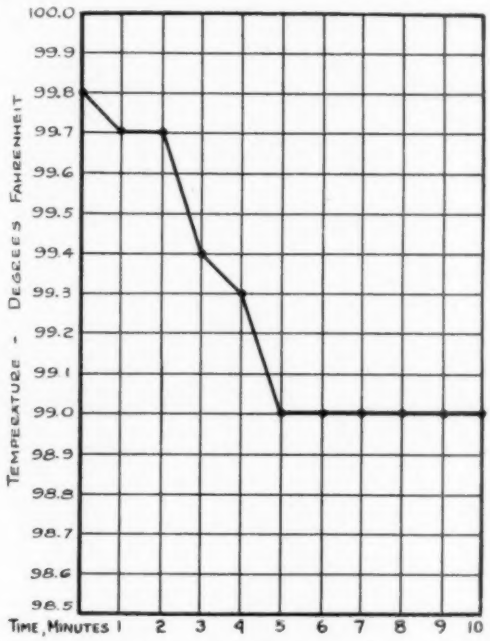


Chart 2.—Curves for cooling after treatment with the Elliott apparatus.

from such methods is due in part to an increased circulation leading to an active hyperemia rather than to any change in temperature. If this is so, we wonder whether it would not be of greater benefit to give daily treatments of longer duration.

SUMMARY

Measurements of the temperature of the antrum were made after treatment by diathermy, the electromagnetic field, the thermospectral lamp, the Cutler water-cooled lamp, compsolite, short wave diathermy and the Elliott machine.

Their ability to produce heat in the antrum was in the following order: (1) electromagnetic field and diathermy, (2) thermospectral lamp, (3) Cutler water-cooled lamp, (4) compsolite, (5) short wave diathermy and (6) the Elliott machine.

In four instances a slight drop in temperature was noted.

A NEW INSTRUMENT FOR MAINTAINING THE PATENCY OF LARYNGOSTOMY OPENINGS

HAYES E. MARTIN, M.D., NEW YORK

The apparatus described in this report was devised several years ago to prevent collapse and contracture of larynogostomy openings when it is necessary to maintain temporarily the patency of the laryngeal stoma after the treatment of laryngeal cancer by irradiation. I have found it to be more satisfactory than any other instrument that I have employed for this purpose and feel that its merits warrant its published description.

So far as I know, laryngostomy to facilitate the interstitial implantation of radon in the treatment of cancer of the intrinsic larynx was first employed by

Fig. 1.—The instrument for maintaining the patency of laryngostomy openings.

Dr. Douglas Quick at the Memorial Hospital for the Treatment of Cancer and Allied Diseases. For the fifteen years prior to the time of writing it has been the method used in the treatment of certain types of advanced cancer of the intrinsic larynx in the clinic of this hospital.

I have found that a laryngostomy opening made for this purpose tends to contract rapidly during the first three to four weeks if it is not kept open by some special device, so that after a few weeks the opening which remains is in effect no larger than that produced by tracheotomy. This contracture renders the proper inspection, subsequent treatment and drainage of the diseased area

difficult. Tucker's laryngostomy tube is of little service in preventing collapse. For a time I tried out the tube devised by Baum,[1] but the objection to Baum's tube (which apparently was not previously used for cancer of the larynx) is that the upright which supports the saddle is fixed and rigid, so that insertion and removal of the apparatus for dressings are both painful and traumatic.

To overcome these difficulties I have devised the instrument [2] illustrated in figure 1. It consists of an ordinary tracheotomy tube to which are attached notched adjustable uprights to support a saddle which can be raised and lowered as desired. The instrument is always inserted and removed with the saddle in its lowered position. After insertion, the saddle is raised until it comes into contact with and engages in the upper angle of the laryngostomy wound, so as to produce as much dilative tension as is considered necessary to prevent contracture. The sliding uprights are notched, so as to permit adjustment to any desired extent in the individual case.

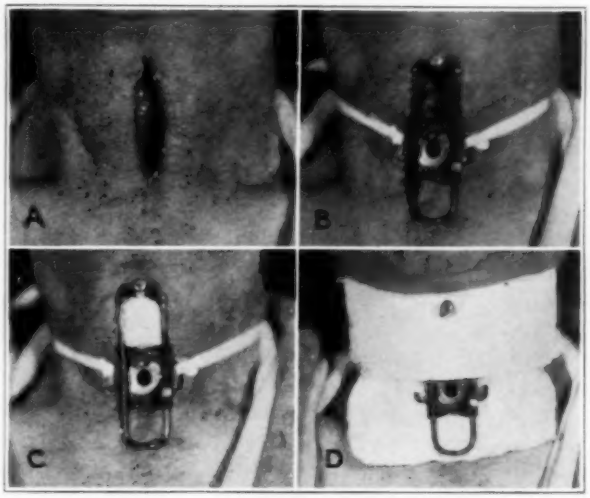


Fig. 2.—*A*, Laryngostomy wound about three weeks after operation. *B*, The wound with the instrument inserted and the saddle raised. *C*, Gauze packing has been loosely placed between the edges of the wound, care being taken that none touches the walls of the trachea or the larynx. *D*, The completed dressing.

When the laryngostomy has been completed and the radon seeds have been implanted, the apparatus is inserted in the opening and the saddle is raised and adjusted. Plain gauze packing is loosely placed between the edges of the wound,

1. Baum, H. L.: A New Procedure for the Care of Postoperative Laryngostomy, Arch. Otolaryng. **2**:581-583 (Dec.) 1925.

2. Mr. A. Schreiner, master mechanic of the machine shop of the Memorial Hospital for the Treatment of Cancer and Allied Diseases, constructed the instrument and made many helpful suggestions during the gradual evolution of the present model. The instrument may now be obtained from The George P. Pilling & Son Company, Philadelphia.

care being taken that none of it comes into contact with the wall of the trachea or the larynx. The operative wound is then dressed in the manner illustrated in figure 2.

The apparatus is removed, cleansed and replaced daily for about a month or six weeks, and during that time the wound is not permitted to contract to less than about 3 to 3.5 cm. in vertical diameter, which is sufficiently large to allow the necessary inspection and further treatment. After that time the edges of the stoma will have healed skin to mucosa, and if the device is removed and an ordinary tracheotomy tube is inserted, the opening will not contract to a vertical diameter smaller than about 2 to 2.5 cm., and it will remain at that size until closed by a simple plastic operation.

OTITIC MENINGITIS

Report of a Case in Which Treatment with Continuous Spinal Drainage Was Used

JOSEPH POPPER, M.D., NEW YORK

So uniformly fatal is septic meningitis of otitic origin that any contribution to the armamentarium of treatment should be welcomed even though it may furnish only a clue to a possible method of successful treatment.

The principle of drainage in the management of septic meningitis has been invoked since Victor Horsley in 1890 performed laminectomy for that disease. Subsequently other methods of drainage, surgical as well as conservative, have been attempted, attacking the spinal subarachnoid space as well as the cranium. Some instances of cure by these methods have been reported; however, since spontaneous recoveries also occur, it is difficult to place much credence in any method which offers only an occasional cure.

On the other hand, drainage by whatever method does offer valuable relief from symptoms of intracranial pressure. Thus, patients in convulsions or coma or those suffering from severe headache and irritability are much relieved by simple lumbar or cisternal puncture. Indeed, in some of the instances reported cure has been definitely attributed to frequent spinal puncture. Furthermore, since operative procedures short of those aimed at the source of infection have so far proved futile, most observers during recent years have been content to resort to the aforementioned conservative measures.

However, there has been one serious handicap to the simple puncture, and that is its disturbing effect on patients who are ill and very irritable; the disturbance is so great that sometimes I have questioned whether the relief gained is worth the effort and loss of vitality associated with its use several times a day. To overcome this handicap attempts have been made to institute permanent drainage without resort to operation. Thus, Kubie [1] in his method of forced drainage used a Bradford frame with a window to accommodate the needle in situ; more recently

---

From the otolaryngologic service of Dr. I. M. Heller, Lebanon Hospital.

1. Kubie, L. S.: Forced Drainage for the Treatment of Meningitis Secondary to Ear and Sinus Infections, Ann. Otol., Rhin. & Laryng. **43**:692-701 (Sept.) 1934.

Schwentker [2] made a metal attachment for the needle to hold it in place and prevent it from slipping.

In May 1935 Love,[3] of the Mayo Clinic, reported the simple expedient of inserting a ureteral catheter through the lumbar puncture needle, withdrawing the needle and leaving the catheter in place. This simple procedure avoids the dangers and discomfort of having a rigid needle in the back. Love reported its use in three instances of conditions other than otitic meningitis. The following case report illustrates its use in such a case.

REPORT OF CASE

M. W., a girl 1 year old, was admitted to the pediatric service of the Lebanon Hospital on May 3, 1935, with the chief complaint of bleeding from the mouth. She was a normal baby and was well until thirteen days before admission, when coryza with fever developed. Two days later there was spontaneous discharge from the right ear. At that time a diagnosis of bronchopneumonia was made, but the temperature came down within a few days; then for three days before admission the temperature ranged between 99 and 101 F. One day before admission she had a severe hemorrhage from the mouth, which recurred on the morning of admission. Examination at that time revealed a well nourished baby, somewhat pale and appearing ill. The temperature was 99 F. The source of the bleeding from the mouth could not be determined. The right ear showed slight purulent discharge, with a small anterior perforation in the drum. The rest of the drum was red and bulging. The left ear showed redness and swelling of Shrapnell's membrane, with landmarks obliterated. There was no apparent tenderness about the mastoid. The rest of the examination gave negative results. A diagnosis of dyscrasia of the blood with bilateral otitis media was considered.

Examination of the blood on the patient's admission showed a hemoglobin content of 66 per cent, 3,800,000 red cells, and 13,800 white cells, with 62 per cent polymorphonuclears, 14 per cent of which were stab cells, and 38 per cent lymphocytes. The platelets numbered 2,900,000. This as well as subsequent tests failed to reveal any dyscrasia of the blood. The Widal test and the roentgen examination gave negative results.

During the next two weeks the child's condition seemed to improve clinically. A bilateral myringotomy was done early and was followed by a free discharge of pus. The temperature, which ranged up to 103 F. for the first few days, gradually fell below 102 F. However, the hemoglobin content gradually came down to 40 per cent, and the white cell and differential counts continued high. At the end of this period there was evidence of sagging of the drum and of the posterior wall of the canal on both sides, and operation was decided on and performed.

At the operation, which was done after a transfusion on the day before, I found single cell mastoids filled with pus and granulations and exposing about a ¼ inch (0.6 cm.) square of the dura of the middle fossa. The dura on the right side appeared edematous and grayish brown. That on the left was only discolored. The organism obtained by culture of the pus was reported to be a hemolytic streptococcus.

---

2. Schwentker, F. F.: Continued Spinal Drainage, Am. J. Dis. Child. **47**: 351-353 (Feb.) 1934.

3. Love, J. Grafton: Continuous Subarachnoid Drainage for Meningitis by Means of a Ureteral Catheter, J. A. M. A. **104**:1595-1597 (May 4) 1935.

After the operation the temperature gradually rose to 105 F., and on May 19, two days after operation, there was a convulsion on the left side. There was no rigidity of the neck and no Kernig or Brudzinski sign. Lumbar puncture yielded 30 cc. of cloudy fluid, which on examination showed 120 cells, 75 per cent of which were polymorphonuclears, and a culture showed the hemolytic streptococcus. A blood culture at that time also showed the same organism.

The next day the wound on the right side was reopened, and the dura was further exposed, but no collection of pus was found.

On May 21 there again occurred some twitching on the left side, and the child became unconscious. At that time a permanent ureteral catheter drain was inserted into the lumbar portion of the spine. Within a few hours consciousness returned, and the condition seemed much improved. Improvement continued for two days, when the child relapsed into stupor and seemed moribund. At that time the right side was again explored after a transfusion. The dura was extensively exposed, and the petrous surface was explored, but no pus pocket was found.

From that time on there were no convulsions. The catheter drain occasionally became clogged as the fluid thickened. It was easily removed, cleaned and replaced, and immediate improvement in the child's condition occurred. During most of the time she appeared so well that except for the temperature, which was remittent between 102 and 104 F., and the fact that the spinal fluid was assuming the character of pure pus, one might have been encouraged to think that she would recover. Her appetite was excellent; her sensorium was clear, and she was even playful at times. As spinal drainage became increasingly difficult I performed several cisternal punctures and at one time attempted to insert a no. 6 ureteral catheter into that space but without avail; the fluid was too thick. She died on June 12, of respiratory failure, twenty-six days after the operation on the mastoid and after at least twenty-four days of septic meningitis.

Postmortem inspection of the wound revealed some pus as the finger separated the dura on the right side and some on the left, but the pathologist could not be certain whether there was an abscess or simply pus exuding from the sulci of the brain.

COMMENT

When one considers that streptococcic meningitis is usually fatal in from two to five days, it seems logical to assume that continuous subarachnoid drainage as exhibited in this case was an important factor in prolonging the life of the patient.

Progress in Otolaryngology

A Summary of the Bibliographic Material Available in the Field of Otolaryngology

THE PARANASAL SINUSES

SAMUEL SALINGER, M.D.
CHICAGO

(Continued from page 240)

OTHER COMPLICATIONS

Acute Rheumatism.—Collet [117] removed the middle turbinate from a man of 41 to give relief from pain due to acute ethmoiditis. Arthritis of the rheumatoid type with nodular masses developed, which yielded only after numerous intravenous injections of salicylates (from 6 to 8 Gm. daily). Culture of the blood gave negative results. Numerous joints were affected, and the patient had fever for nearly a month. The author terms this complication a pseudorheumatism of an infectious nature with rheumatoid manifestations.

Labyrinthitis.—Mounier-Kuhn [118] reports 2 cases of vertiginous attacks, mostly in the sagittal plane, which were due to infection of the maxillary and ethmoid sinuses. The author shows that the toxic irritation of the otoliths produced the maximal stimulation once described by Quix and engages in a long discussion as to the interpretation of the various responses of the otoliths described by Quix, Jacod and others. In both of the cases described the attacks were so severe as to cause marked agoraphobia, and in both instances drainage of the infected areas resulted in prompt recovery.

Osteomyelitis.—Roberts [119] reports 2 cases of osteomyelitis and abscess of the frontal lobe due to acute frontal sinusitis contracted in a swimming pool during the hot weather of 1934. Both patients were operated on about a month from the onset, and extensive osteomyelitis and a well encapsulated abscess were found. The author made a large skin-periosteum flap, removed the bone widely and drained the abscesses with rubber tubing. These cases demonstrate the value of delayed

117. Collet, F. J.: Pseudo-rhumatisme infectieux d'origine sinusienne, Lyon méd. **67**:161 (Feb. 10) 1935.

118. Mounier-Kuhn, M. P.: Contribution à l'étude des vertiges au cours des sinusites, Lyon méd. **67**:244 (Feb. 24) 1935.

119. Roberts, S. E.: Frontal Sinusitis with Osteomyelitis and Frontal Lobe Brain Abscess, Following Swimming, J. Kansas M. Soc. **36**:312 (Aug.) 1935.

operation, of good roentgenograms and of radical surgical intervention. The author believes that bathers who spend too much time in the water lower their resistance and expose themselves to the danger of severe sinus disease.

Another instance in which radical surgical intervention was effective is reported by Goldman [120] in a boy of 10. The onset was acute with chills and high fever, swollen lids, tender frontal sinuses and edema. There was much creamy pus in the nose, and the roentgenograms showed marked cloudiness of all the sinuses on one side. One frontal sinus was absent. The diseased bone was removed widely into healthy tissue over an area of 3 square inches (19.4 sq. cm.).

In Howie's [121] patient osteomyelitis developed one month after an external operation for acute frontal sinusitis. The author reflected a flap downward from the hair line to expose the diseased bone. He claims that this procedure results in less scarring and deformity.

Von Eicken,[122] after describing several cases of acute osteomyelitis of the frontal bone, expresses his interest in a large diploic vein running from the zygomatic process of the frontal bone upward to the tuber frontale. He considers this vein a vital agent in spreading osteomyelitis and finds it present more often than has hitherto been suspected. Another frequent finding corroborated by studies of numerous skulls is the presence of well developed bone marrow in the zygomatic process, particularly in skulls with extensively developed frontal sinuses. Infection is carried upward from this area toward the vertex by way of the vein previously mentioned. The vein is frequently seen entering the longitudinal sinus, and the author has been able to demonstrate it in his roentgenograms, usually surrounded by foci of the osteomyelitic process.

In Kindler's [123] patient osteomyelitis developed after a radical operation on the frontal sinus. Typical septicopyemic symptoms ensued, with signs of meningitis and of a possible abscess of the brain. A wide exposure of the dura and puncture of the frontal lobe gave negative results. Autopsy revealed a hemorrhage in the frontal lobe. The author feels that the abscess was truly metastatic.

---

120. Goldman, I. F.: Radical Resection of the Frontal Bone for Osteomyelitis Following Acute Sinusitis, J. Mt. Sinai Hosp. **1**:260 (March-April) 1935.

121. Howie, T.: An Unusual Approach to the Frontal Sinus, J. Laryng. & Otol. **50**:859 (Nov.) 1935.

122. von Eicken, C.: Ueber rhinogene Osteomyelitis cranii, Ztschr. f. Hals-, Nasen- u. Ohrenh. **38**:186, 1935.

123. Kindler, W.: Osteomyelitis des Stirnbeins mit Schläfenlappenabszess und Stirnhirnblutung nach Stirnhöhlen-Radikal-Operation, Ztschr. f. Laryng., Rhin., Otol. (Teil 1: Folia oto-laryng.) **26**:152, 1935.

In Games and Agra's [124] patient osteomyelitis followed an intranasal operation on the ethmoid sinus, performed according to the method of Halle. It began in the frontal process of the superior maxilla and extended upward. A cure was effected only after extensive resection of the frontal bone.

Lederer [125] describes a case of osteomyelitis of the upper jaw in a 3 week old infant which was complicated by thrombosis of the cavernous sinus and ended fatally. Autopsy demonstrated the onset of the process in the inferior turbinate. Periostitis of the upper jaw and of the periorbital ethmoid cells ensued, with rupture of pus through the hard palate and into the eyelids. Septic thrombi originating in the antrum spread to the cranial sinuses.

BENIGN TUMORS

Mucocele.—Mucocele of the maxillary sinus is a rather infrequent entity, but Imai [126] reports 4 cases in which this condition occurred after a radical operation on the antrum performed some years previously for a condition which was diagnosed as carcinoma. Operation disclosed cystic cavities the walls of which were rich in blood vessels and lined with epithelium. No glands were present. The growths were firmly adherent in the region of the ostia.

Mucocele of the frontal sinus is more frequent. Mazzini and Cesio [127] describe a case in a man of 60 in which the tumor attained the size of a hen's egg, displacing the bulb downward and outward and causing headache, somnolence and frontal ataxia. When the mass was opened and evacuated, it left a space which measured 12 cm. anteroposteriorly. The cavity was not curetted for fear of spreading the infection. Drainage via the ethmoid cells was instituted at a subsequent operation. A year later the cavity was still draining into the nose.

Hartung and Washowski [128] report 4 cases of mucocele and call attention to the characteristic roentgenographic picture, viz: enlargement of the sinus, erosion of its walls, increased translucency, displacement of the boundaries of the sinus, distortion of outline and frequently reactionary new bone formation.

---

124. Games, F., and Agra, A.: Osteomielitis del hueso frontal, Rev. Asoc. méd. argent. **49**:25 (Jan.) 1935.

125. Lederer, F. L.: Fulminant Sinus Disease: Study of Pathogenesis, Surg., Gynec. & Obst. **60**:645, 1935.

126. Imai, T.: Ueber Mucocelen des Sinus maxillaris die viele Jahre nach Radikaloperation des Empyema Highmori beobachtet wurden, Ausz. z. Otol. (Tokio) **39**:21, 1933; abstr., Zentralbl. f. Hals-, Nasen- u. Ohrenh. **25**:36, 1935.

127. Mazzini, O. F., and Cesio, M.: Mucocele frontal determinando fenómenos de compressión cerebral, Bol. y. trab. de la Soc. de cir. de Buenos Aires **19**:640 (Aug. 14) 1935.

128. Hartung, A., and Washowski, T.: Mucocele of Frontal Sinus: Roentgen Aspects; Report of Four Cases, Am. J. Roentgenol. **34**:30 (July) 1935.

In Cavanaugh's case [129] the tumor was outlined by injecting iodized oil into the frontal sinus.

Valerio [130] reports a case of mucocele which he thinks developed on an inflammatory base. He mentions trauma as a frequent cause in cases in which the pathologic process is active. His patient was a man of 49 in whom a mucocele the size of a hen's egg had destroyed the upper portion of the sinus and was firmly adherent to the dura. Separation was fraught with great danger and required painstaking care.

De Melo Filho [131] saw a large mucocele of the ethmoid sinus which occupied half of the orbital cavity and caused secondary glaucoma, necessitating removal of the eye. He claims that glaucoma has never been mentioned as a complication of mucocele, and in this particular case he believes that it was due to uveitis. As a diagnostic procedure he punctured the mass, evacuated the fluid and injected iodized oil, which outlined the cavity perfectly.

Pyocele.—An infected cystic cavity in the maxillary sinus is described by Pais [132] which was the result of caries following the removal of a molar about seven years previously. Operation disclosed a cystic mass in the antrum in relationship to a fistula of the old tooth socket which was filled with a gelatinous fungoid material and pus. The medial or nasal portion of the sinus was only slightly altered by a chronic inflammatory process. The author states that the infection arose from an apical infection of the tooth and extended to the bone, causing caries and stimulating the mucosa to pathologic activity. In discussing the pathogenesis of mucocele, he mentions the theory of de Maldent and de Lapersonne that the condition is a form of chronic attenuated sinusitis and the theory of Reverchon, Worms, Bruzzoni and others that it is due to a cystic degeneration of the mucous glands. In any event, obstruction of the normal ostium is a predisposing element.

In Kotake's [133] patient a painful swelling of the cheek developed four years after a radical operation on the antrum. Roentgenograms showed neither a tooth nor a tumor. Operation disclosed a cyst containing pure pus, which was lying in an isolated bony cavity. Histologic

129. Cavanaugh, J. A.: Mucoceles of the Frontal Sinus, Laryngoscope **45**: 205 (March) 1935.

130. Valerio, M.: Considerazioni tratte dall'esame di un caso di mucocele gigante del seno frontale, Riv. oto-neuro-oftal. **12**:585 (July-Aug.) 1935.

131. de Melo Filho, G.: Mucocele Etmoidal, Rev. oto-laring. de São Paulo **2**: 485 (Nov.-Dec.) 1934.

132. Pais, C.: Fistola alveolare del seno mascellare con mucocele suppurato, Valsalva **11**:217 (April) 1935.

133. Kotake, Y.: Pyocele im Oberkiefer, Otologia (Fukuoka) **8**:624, 1935; abstr., Zentralbl. f. Hals-, Nasen- u. Ohrenh. **25**:270, 1935.

examination showed inflamed mucosa from the ethmoid sinus. The author believes that the case was one of pyocele of a misplaced ethmoid cell.

Sato [134] removed a swollen middle turbinate from a woman of 60 and found a cyst filled with about 15 cc. of dark mucoid material containing many staphylococci. The cavity measured 2.5 by 1.5 by 1 cm. Radical exenteration of the ethmoid sinus was done, with complete relief.

Alpin [135] describes a pyocele in a man of 45 which developed from the left ethmoid cells and eroded not only the lamina papyracea but the inner third of the supra-orbital margin as well, both nasal bones in their upper third, both frontal processes of the maxillae and the opposite lamina papyracea. It therefore involved both ethmoid sinuses and both frontal sinuses. For a period of several years there would be a spontaneous discharge from the nose, which would reduce the size of the tumor for a while. It was removed through a typical Preysing T-shaped incision. After removing the sac, the author completed the operation by the Riedel method, thus obliterating the left frontal sinus completely.

In Laskiewicz's [136] case pyocele was due to a fracture of the frontal bone with delayed healing. A fistula remained in the scar, and there was an intermittent swelling from time to time. The appearance of tenderness and extensive swelling to the root of the nose led to roentgen studies, which showed a rounded mass in the left frontal sinus and pansinusitis on the left. Killian's operation disclosed two sequestrums and a pyocele the size of a plum. The author reports another case, in which also the condition was due to trauma, sustained six years previously. Among the diagnostic signs listed in these cases were blockage of the nasofrontal duct, negative intranasal findings, external swelling and the characteristic crepitus.

Von Eicken [137] also cites 2 cases, in 1 of which the pyocele was due to a shrapnel wound received many years previously (1918). There were swelling and tenderness at the root of the nose, and roentgenograms showed a well circumscribed mass. Operation disclosed a mucopyocele which had eroded both the anterior and the posterior wall of the frontal sinus.

---

134. Sato, J.: Ueber Pyocele der Siebbeinzelle aus der Bulla der mittleren Muschel, Otologia (Fukuoka) **8**:617, 1935; abstr., Zentralbl. f. Hals-, Nasen- u. Ohrenh. **25**:270, 1935.

135. Alpin, J.: Zur Kasuistik der Pyocele ethmoidalis, Monatschr. f. Ohrenh **68**:1009 (Aug.) 1935.

136. Laskiewicz, A.: Sur les empyèmes enkystés du sinus frontal (pyocèle frontale), Rev. de laryng. **56**:561, 1935.

137. von Eicken, C.: Ueber ungewöhnliche Befunde bei Stirnhöhlenaffecktionen, in Kubo, Ino: Festschrift zu seinem 60. Geburtstag, Tokyo, The Herald Press, Ltd., 1934, p. 330.

Osteoma.—There were a number of reports of osteoma last year, the most complete discussions being presented by Sjöberg [138] and Carmody.[139] The former describes 2 cases affecting the maxillary sinus, a rather rare condition. Statistics from the Sabbatsberg Clinic for the period 1910 to 1934, inclusive, disclosed a total of 1,197 major operations on the maxillary sinuses for various conditions, of which only 2 were for the removal of an osteoma. In both cases there were external evidences of the growth, such as swelling of the cheek and obliteration of the nasolabial fold. Suspicion as to the nature of the trouble was aroused through unusual resistance encountered in attempts to puncture the sinus for lavage. Roentgenograms, however, readily outlined the mass, which appeared as a dense, well defined tumor. In 1 case the shadow was not of uniform density owing to the spongy nature of the bone. In 1 case the growth originated in the naso-antral wall, grew into the antrum and by pressure caused a thinning of the orbital and palatal plates. The other tumor grew from both the facial and the oral wall of the sinus. Histologic examination showed newly formed spongy connective tissue bone and marrow spaces filled partly with connective tissue and partly with fat. The tumors were covered with ciliated epithelium resting on a connective tissue stratum. The author points out that there is considerable difference of opinion as to whether these tumors originate from cartilage rests or from periosteal activity. Carmody [139] also discusses the theories of the genesis of osteoma and adds the following to the two theories just mentioned, namely, that the growth originates from the diploe, from ossified polypi or from trauma and that it is due to syphilis. He summarizes reports of 139 cases collected from the literature and adds 6 from his own experience. He finds the tumor most frequently in the male and during the period of adolescence. In 2 of his cases it invaded the maxillary sinus. One of the patients had a postoperative infection, was reoperated on and died in epileptiform convulsions after the injection of alcohol into the left infra-orbital nerve for relief from pain. The other 4 cases involved the frontal sinus; operation was performed with successful results. In 1 of the cases the infection was extensive, reaching into the orbit and through the posterior wall of the sinus. A pneumatocele was made out in the roentgenogram, and when the tumor was removed there was an escape of air. As the dura was adherent, it was lacerated, and cerebrospinal fluid escaped. The patient suffered from convulsive seizures intermittently for three years but finally recovered.

---

138. Sjöberg, A. A.: On the Clinical Treatment of Osteoma of the Maxillary Sinus, Acta oto-laryng. **23**:157, 1935.

139. Carmody, T. E.: Osteoma of the Nasal Accessory Sinuses, Ann. Otol., Rhin. & Laryng. **44**:626 (Sept.) 1935.

Handousa [140] reports 7 cases of osteoma, 1 of the maxillary sinus, 1 of the presphenoid region, which was too extensive for surgical removal, and the others involving the frontal and ethmoid sinuses. He also describes a reticuloma on the right side of the nose which resembled a lymphoid tumor. It was removed surgically and found to be adherent to the outer nasal wall.

Dei Rossi's [141] patient, a man of 21, complained of a vague sense of pulsation in the frontal region after trauma. Roentgenograms revealed a large tumor in the midline. At operation the dura and the longitudinal sinus were both exposed. The cortex of the tumor was extremely dense, but the core was spongy.

Gatewood and Settel's [142] case was also one in which a large osteoma was attached to the cranial plate and the floor.

Panug [142a] contributes a general discussion of the subject and reports removing an osteoma weighing 2.5 Gm. from the right frontal sinus of a woman of 56.

In Vincent and Mahoudeau's case [142b] the tumor was located in the orbit, having eroded its roof and extended into both the frontal and the ethmoid sinus. A large pneumatocele was seen extending backward as far as the vertex. On exposure, the osteoma was found to be covered on its anterior surface with mucosa derived from the sinuses and spreading in more or less attenuated form almost completely around it. The dura, being tightly adherent, was badly torn during the operation. Closure was effected by a transplant of fascia lata, as advised by Cushing.

In Bryant's case,[142c] that of a man of 23, the osteoma was associated with secondary infection of the frontal sinus, there being a history of several acute attacks of pain and swelling. The swelling was incised and drained. Operation disclosed a large subperiosteal abscess, a pyosinus and erosion of the posterior wall and the exposed dura was covered with granulation. A large osteoma of the ethmoid sinus blocked the nasofrontal duct. When removed, it looked like a complete cast of the ethmoid sinus.

---

140. Handousa, A. S.: Rare New Growths in Relation to the Nasal Cavities, J. Egyptian M. A. **18**:674 (Oct.) 1935.

141. dei Rossi, A.: Un caso di osteoma dei seni frontali, Arch. ital. di otol. **47**: 657 (Sept.) 1935.

142. Gatewood, W. L., and Settel, N.: Osteoma of the Frontal Sinus, Arch. Otolaryng. **22**:154 (July) 1935.

142a. Panug, M.: Ueber osteome der Stirnhöhle, Orvosképzes **24**:24, 1934.

142b. Vincent, C., and Mahoudeau, D.: Sur un cas d'ostéome ethmoïdo-orbitaire avec pneumatocèle opéré par la méthode de Cushing, Rev. neurol. **63**:993 (June) 1935.

142c. Bryant, B. L.: Osteoma of the Ethmoid: Report of a Case, Laryngoscope **45**:854 (Nov.) 1935.

Cyst.—Eleven years after a radical operation on the antrum Shigyo's [143] patient suffered from pain and swelling in the cheek. Radical excision of the mass from the canine fossa revealed a cyst containing yellowish fluid but no bacteria or cholesteatoma. The cyst was lined with a single layer of pavement epithelium. In his second case the cyst developed three years after operation on the antrum. The cyst was the size of a large bean and was located just external to the pyriform margin; its walls were made up of tightly compressed layers of connective tissue.

Immenkamp [144] explains that the development of radicular cysts about the upper premolar and molar teeth often leads to encroachment on the antrum. This is especially so if the roots of the teeth project into the antrum: a breaking down of the intervening bone allows the cyst to grow into the antral cavity. The development of the cyst often causes a resorptive apical osteitis. Operative treatment depends on the size of the cyst. Frequently a root is pushed into the antrum during an extraction, which necessitates opening the antrum. The author describes the usual methods of closing alveolar fistulas.

Neurinoma.—Mittelbach and Woletz [145] report 2 cases of neurinoma of the nose in youths 17 and 25 years of age. Each growth was a large bluish mass. In the first case it filled the nose, antrum and ethmoid cells, and in the other, the nasal cavity alone. The Denker operation was done in the latter case and the Moure in the former. Definite connection with a nerve trunk was not demonstrated, but histologic examination proved the diagnosis. The examination showed typical parallel placement of the cells, hyalin-like bands of fibers and a general fibrillary-reticular structure. Silver stains brought out the fibrillary network of the ground substance. The author calls attention to the similarity of structure of schwannoma as reported in the American literature.

Fibroid Tumor.—Hertel [146] cites 2 cases of nasopharyngeal fibroid tumor, in 1 of which the growth progressed externally into the cheek. This observation supports the theory of Coenen that these tumors originate from the chondrocranium. This region embraces the outer pterygoid plates, from which the fibroid tumor may grow and extend outward instead of growing into the nasopharynx.

---

143. Shigyo, S.: Zur Kasuistik von postoperativen Wangencysten, Otologia (Fukuoka) **8**:426, 1935; abstr., Zentralbl. f. Hals-, Nasen- u. Ohrenh. **25**:37, 1935.

144. Immenkamp, A.: Zur Klinik odontogen bedingter Komplicationen mit der Kieferhöhle, Deutsche zahnärtzl. Wchnschr., 1935, p. 621.

145. Mittelbach, M., and Woletz, F.: Zwei Fälle von Neurinom der Nase, Med. Klin. **31**:275 (March 1) 1935.

146. Hertel, E.: Pterygo-maxilläres Basalfibroid beim freiem Nasenrachen, Deutsche Ztschr. f. Chir. **244**:548, 1935.

Xanthoma.—Schul [147] presents a complete description of Schüller-Christian's disease and describes a case in a man of 47 in which operation on the frontal sinus revealed a xanthomatous mass. The typical Schüller-Christian triad was present except for diabetes insipidus. The disease is due to a disturbance of lipoid metabolism, in contradistinction to Niemann-Pick's disease, which is caused by changes in phosphate metabolism. In the author's case the cholesterol content was increased to 240 mg. per hundred cubic centimeters.

Meningioma.—Olivecrona and Urban [148] describe 9 cases of meningioma. One patient died after the operation. The condition of 1 remained unchanged and 3 were cured except for amaurosis and 4 except for partial defects of the visual fields. When the growth involves the ethmoid plate it is benign and frequently bilateral and presents a typical structure of meningeal endothelioma. Of particular interest are the symptoms which arise from pressure on the frontal lobe and optic nerves. Frequent symptoms are psychic disturbances, such as loss of memory, facetiousness, frontal headache, anosmia, central scotoma and choked disk. Roentgenograms show signs of generalized pressure and local defect. Ventriculograms show both anterior horns pushed upward and backward and the third ventricle displaced. The operation consists of partial resection of the frontal lobe, shrinkage of the tumor by penetration with the cautery and suction, followed by removal of the tumor through its capsule.

MALIGNANT TUMORS

Tumor of All Sinuses.—Geschickter [149] presents a study of 211 tumors of the nose and sinuses from a total of 2,000 specimens removed at the Johns Hopkins Hospital. They were divided as follows: benign epithelial tumors, 19; malignant epithelial tumors, 139; benign connective tissue tumors (exclusive of osteoma), 37, and sarcomas, 16. The various types are described, and typical examples are shown. It is interesting to note that Geschickter found 73 cases of epidermoid carcinoma of the maxillo-ethmoid area which he calls squamous cell or transitional cell carcinoma and 49 cases of lympho-epithelioma. The author points out that the latter were formerly classed with the sarcomas.

Lederer [150] discusses diagnosis and treatment. He claims that it is not always possible to determine the site of inception of the growth,

147. Schul, J.: Beitrag zur Klinik des Xanthoms der Sinus frontalis, Inaug. Dissert., Cologne, 1934.

148. Olivecrona, H., and Urban, H.: Ueber Meningeome der Siebbeinplatte, Beitr. z. klin. Chir. **161**:224, 1935.

149. Geschickter, C. F.: Tumors of the Nasal and Paranasal Cavities, Am. J. Cancer **24**:636, 1935.

150. Lederer, F. L.: Cancer of the Nasal Accessory Sinuses: Problems on Diagnosis and Management, Arch. Phys. Therapy **16**:199, 1935.

and therefore the terms "primary" and "secondary" are not dependable. It is better to designate the tumor by the areas involved. Roentgenograms should be studied, particularly for changes in the bony structure. He favors combined roentgen irradiation and surgical diathermy for the treatment. If radium is available it is safer to use intracavity contact than teleradium because of the danger to the bone by the latter method. Theoretically, therapy depends on the histologic picture of the tumor, but, practically, more can be predicted from the rapidity of its growth, its infiltrative properties and its tendency to metastasis.

Nash's [151] procedure in cases of malignant tumor of the sinuses is as follows: diagnosis roentgenographically with the aid of contrast mediums, external opening for removal of tissue for biopsy, window drainage and irradiation, consultation as to the pathologic process, and irradiation with or without diathermy, as required. Another routine sometimes used is extirpation surgically or by diathermy followed by irradiation. An interesting commentary on the lack of agreement among pathologists is presented by the author in a summary of the varying diagnostic signs and the treatment suggested by 5 pathologists to whom a description of the symptoms and a specimen from 1 case were submitted. Nash obtained cure in 2 of 9 cases. In 6 cases the condition was already too far advanced when first seen to offer much hope from treatment.

Robinson [152] reports cure for a period of three years in 15 of a series of 60 cases. He suggests that exploratory operation and examination of suspicious tissue be done more frequently than it is. Most of his patients were treated by combined operation and radium therapy. The latter was applied partly by interstitial implantation and partly by application to the surface of the sinus. He suggests that for a very cellular radiosensitive tumor radical surgical intervention is not indicated.

While the title of Martin's [153] paper would indicate that the sinuses were involved in some of his cases, the text affords no clue as to how many there were in this group. His statistics show that 21 per cent of the patients were free from disease for periods of from eighteen months to three and one-half years. He presents a detailed description of the Coutard technic and discusses the reactions and complications.

---

151. Nash, C. S.: The Management of Malignancies of the Sinuses, Ann. Otol., Rhin. & Laryng. **44**:220 (March) 1935.

152. Robinson, G. A.: Diagnosis and Treatment of Malignant Tumors of the Nasal Sinuses, Am. J. Roentgenol. **34**:641 (Nov.) 1935.

153. Martin, H. E.: The Fractional or Divided Dose Method of External Irradiation in the Treatment of Cancer of the Pharynx, Tonsil, Larynx and Paranasal Sinuses, Acta radiol. **16**:1, 1935.

Clark [154] has found electrocoagulation most effective. He fears the local application of radium because of the danger of porosity and late necrosis of bone. He advises the use of well filtered radiation at a distance and prefers radium to roentgen rays. Preoperative irradiation is indicated only in tumors that are particularly radiosensitive. Metastases offer a problem which must be solved according to the individual case and the surgeon. Irradiation alone is only palliative, but combined with surgical intervention it offers slightly better prospects.

Tumors of the Maxillary Sinus.—Harmer [155] has found that 64 per cent of all malignant tumors of the antrum are carcinomas. The growth is usually very malignant, invades adjacent cavities and shows a marked tendency to recur after incomplete removal; it rarely metastasizes until late. Twenty-six per cent of all malignant tumors of the antrum are sarcomas, and they are usually extremely malignant. The author claims that endothelioma, forming 10 per cent of the total, is probably allied to carcinoma. The endothelioma grows slowly and tends to recur and metastasize after incomplete removal. Harmer believes that removal of tissue for biopsy may prove dangerous, and he advises doing it with the endotherm knife or preceding it with a small dose of high voltage irradiation. He advises combined surgical intervention, diathermy and irradiation in the treatment and prefers the transcanine or palatal approach. The growth should be thoroughly eradicated, followed by surface application of radium about the fiftieth day. The radium needles are placed on a dental plate made of lead to protect the tongue and mouth, and this is worn first for two hours night and morning and later for a longer time. The period of treatment covers from ten to twenty days, with a total of from 1,000 to 2,000 mg. hours. The author reports that 14 of 49 patients with carcinoma are living (6 for over five years). Two of the patients with light rodent ulcer are living. The results of the treatment of sarcoma were better. Fifteen of 29 patients are living for long periods. Only 2 of 8 patients with endothelioma survived.

New and Cabot's [156] report is most impressive. They give a résumé of 295 cases of tumor of the maxillary sinus in which operation was performed prior to Jan. 1, 1929. Ninety-one of the tumors were primary in the antrum and 50 were apparently secondary. Forty per cent of the patients with a primary tumor were without recurrence after

154. Clark, W. L.: Neoplastic Lesions of the Accessory Sinuses and Orbit, M. Rec. **141**:409 (May 1); 509 (June 5) 1935.

155. Harmer, W. D.: Treatment of Malignant Disease in the Upper Jaw, Lancet **1**:129 (Jan. 19) 1935.

156. New, G. B., and Cabot, C. M.: The Curability of Malignant Tumors of the Upper Jaw and Antrum, Tr. Am. Laryng., Rhin. & Otol. Soc. **41**:584, 1935.

five years; 72 per cent of those with primary sarcoma were alive and well after five years. A higher percentage of cures (55.6 per cent) was obtained in the treatment of low grade malignant epithelial tumors than of the high grade (3 and 4) malignant growths (34.5 per cent).

Fifty-three per cent of the persons with a secondary malignant tumor of the antrum were cured for five years or more. "These tumors originate in the upper jaw and the prognosis is better than with primary malignant tumors." Of the entire group, i. e., those with primary and those with secondary tumor of different types, 44.9 per cent were alive and free from recurrence after five years. The procedure described for the treatment of these tumors is as follows: nitrous oxide anesthesia administered intratracheally, an alveolar or palatal approach, biopsy and frozen sections. Tumors of a low grade of malignancy are destroyed by diathermy. Those of a high grade of malignancy are also attacked with electrocoagulation, but more with the idea of establishing drainage and affording access for radium therapy. "A protected endotherm point with the spark gap almost closed is used in approaching the more dangerous regions of orbit or ethmoid bone, whereas a large point with the spark gap well open is employed in regions wherein wide destruction will not be of any serious consequence."

Holmgren's results[157] match those obtained at the Mayo Clinic, except that he reports cures of two years' instead of five years' duration, which makes the results at the Mayo Clinic more significant. He reports that 44 per cent of his patients were well for two years or more. His present procedure consists of preliminary ligation of the external carotid artery (New finds this rarely necessary); local anesthesia, according to the method of Payr; a transcanine approach; destruction of the mass with diathermy, and local application of radium.

A sarcoma developing at the site of a previously diagnosed gumma is reported by Halphen and Maspetiol.[158] The original diagnosis of the mass which filled the antrum, nasal cavity and ethmoid sinus, displacing the bulb, was carcinoma. The Wassermann reaction was strongly positive, and biopsy gave negative results as to malignancy. The tumor receded under antisyphilitic treatment. One year later, despite continued treatment, the tumor reappeared below the orbit, and biopsy showed it to be sarcoma. Under the Coutard treatment, up to 1,500 roentgens, the tumor regressed.

---

157. Holmgren, G.: Einige Worte über Oberkiefer- und Siebbein- Carcinom, in Kubo, Ino: Festschrift zu seinem 60. Geburtstag, Tokyo, The Herald Press, Ltd., 1934, p. 283.

158. Halphen and Maspetiol: Gommes du sinus maxillare à forme pseudoneoplasique, Bull Soc. franç. de dermat. et syph. **42**:229, 1935.

Rebattu and his associates [159] describe a case in which the presence of a malignant growth was masked by symptoms of alveolar periostitis. Both clinical and roentgenographic examination seemed to point to the latter. Radical operation on the antrum disclosed granulations, which only on repeated examination were found to be carcinomatous.

Kean [160] cites an interesting case of sarcoma of the antrum in a pregnant woman. The growth was of the spindle cell variety, involving the alveolus and the naso-antral wall. The antrum was "cleaned out" and packed with radium tubes (2,000 millicurie hours). Application of high voltage roentgen rays was started but was interrupted by the patient who on her return to the clinic was pregnant. She was advised to have the pregnancy interrupted but refused on religious grounds. Another course of irradiation was given, but the growth increased in size. Radium was then applied in a wax mold with a 4 mm. lead filter at 1.5 cm. for a total of 20,000 millicurie hours. There was marked improvement, and at the termination of the pregnancy the wound was healing. A year later there were no signs of recurrence. It is interesting to note that the growth yielded to radium after the roentgen rays had failed.

Adenoma of the nose and sinuses is extremely rare, but Natanson [161] claims to have found 42 recorded cases and reports 1 of his own which he followed for over ten years. He describes two types, a benign growth, which is small, smooth and circumscribed, growing from the septum, the middle turbinate or the posterior end of the vomer, and a highly malignant growth, attaining large proportions and characterized by friability, vascularity and a tendency to recur. This type does not infiltrate until late and rarely metastasizes. The author's patient, a woman of 27, was operated on at least seven times by the Denker method and later by the Langenbeck method, with recurrences at intervals of from one to two years, until eventually the orbit and the base of the brain were involved and the patient died of cachexia. Histologic examination of tissue at each operation repeatedly showed a structure that was typically adenomatous, and only toward the end, when the recurrences were more frequent, did the specimens show evidence of malignancy by the presence of epithelial sprouts, mitoses and absence of basilar structure. Prolonged roentgen treatment seemed to make no impression.

---

159. Rebattu, J.; Proby, H., and Perron: Cancer du sinus maxillarie à forme d'ostéite dentaire, Ann. d'oto-laryng., 1935, p. 286.

160. Kean, A.: A Case of Sarcoma of the Antrum Complicated by Pregnancy, Treated by Irradiation, Radiology **25**:321 (Sept.) 1935.

161. Natanson, L.: Ueber Adenome der Nase und ihrer Nebenhöhlen, Acta oto-laryng. **23**:167, 1935.

Young [162] reports the case of a child of 5 years who suffered from concussion and injuries to the forehead and presented a swelling of the right upper alveolus. Incision disclosed a tooth, and examination of granulomatous tissue led to a diagnosis of adamantinoma. Large doses of radium were applied. Vomiting, melanemia and acidosis soon developed, followed by swellings in the abdomen and both femurs. Death occurred two months after admission. Autopsy revealed general peritonitis, an extensive tumorous growth on the wall of the stomach and adherence of the duodenum to a large tumorous mass in the region of the pancreas extending to the hilus of each kidney. Histologic examination showed a typical neuroblastoma, which was primary in the adrenal glands.

Heidt [163] reported a case of cylindroma of the antrum in a man of 50 which invaded the orbit. His operation was incomplete, which fact he justifies by the statement that such a tumor is not malignant. He refers to a similar case reported by Van Noosten and Vos in which conservative surgical measures were found to be adequate.

Reichel [164] agrees with Borst that a tumor may be called a psammoma only when calcification is present in both the parenchyma and the stroma. He says that the literature contains reports of only 6 cases of psammoma outside of the central nervous system. His patient was a girl of 14 with a tumor of the left side of the nose. The Denker operation was done, and the antrum was found to be filled with a grayish-red soft hemorrhagic tumor containing numerous sand bodies. It extended into the nose and the ethmoid sinus. It was thoroughly exenterated, and this was followed by irradiation. Histologic examination showed a malignant tumor the connective tissue of which was filled with numerous calcareous bodies. These bodies did not appear in the usual layer formation, but otherwise the tumor was identical, both macroscopically and microscopically, with previously described psammomas.

Watson-Williams and Wigoder [165] named a tumor of the antrum and ethmoid sinus occurring in a man of 44 "schneiderian carcinoma" on the basis of the following histologic report: ". . . growth composed of loose connective tissue showing much round-cell infiltration in

---

162. Young, G.: Neuroblastoma: Metastasis from Suprarenals, J. Laryng. & Otol. **50**:860 (Nov.) 1935.

163. Heidt, K.: Ueber Behandlung der Cylindrome der Oberkieferhöhle, Geneesk. tijdschr. v. Nederl.-Indië **75**:1396, 1935; abstr., Zentralbl. f. Hals-, Nasen- u. Ohrenh. **26**:225, 1936.

164. Reichel, R.: Ein Sarcoma psammosum, der Nasen-, Kiefer- und Siebbeinhöhle, Erlanger Dissert., 1934; abstr., Zentralbl. f. Hals-, Nasen- u. Ohrenh. **26**: 25 (Jan. 25) 1936.

165. Watson-Williams, E., and Wigoder, S. B.: Schneiderian Carcinoma of Ethmoid and Antrum, J. Laryng. & Otol. **50**:925 (Dec.) 1935.

places. Blood vessels fairly numerous. Covered by transition epithelium which in places is growing downwards and is showing infiltrating growing edge. Cells mostly of the embryonic type showing some inequality of shape and size and evidence of rapid growth." After treatment by operative measures and the insertion of radium needles, it disappeared. No recurrence had been observed after ten months.

Primary carcinoma of the frontal sinus is rare. Geschelin [166] reports such a tumor in a man of 46, which was inoperable. The diagnosis was confirmed by biopsy. Satake [167] observed a similar tumor in a man of 52 who presented a history of recent trauma. A Killian operation disclosed a bony defect in the orbital, cerebral and medial walls of the frontal sinus. Biopsy showed squamous cell carcinoma. At autopsy it was found that the growth had invaded the ethmoid sinuses and metastasized to the cervical lymphatic glands.

Levesque and Ganducheau [168] report 6 cases of malignant tumor of the ethmoid sinus with recovery in 5 for from four to twelve years. One tumor was a myxosarcoma, and the rest were epitheliomas. The treatment consisted of lateral rhinotomy with wide removal of tissue into the healthy bed, followed by the immediate application of radium in tubes screened by 1 mm. of platinum and encased in rubber. The average dose given was 3,865 roentgens. With radium emanation the average dose was from 22.2 to 29.7 millicuries.

Calvert [169] describes a basal cell carcinoma of the sphenoid sinus in a man of 33. The growth appeared as a polypoid mass on the anterior wall and was removed through the nasopharynx. It was first reported to be a fibroma, but when the headaches and ocular symptoms increased reexamination showed masses of tumor higher up. Roentgenograms revealed complete loss of the Granger line and evidence of erosion of the posterior wall of the sinus. The sphenoid sinus was operated on with the area under local anesthesia, and when the anterior wall was removed the sinus was found to be filled with a firm, bleeding mass. Treatment was instituted with a radium bomb through seven portals of 6 sq. cm. each at a distance of 10 cm. for a total of 230,000 milligram hours. There was marked recession of the growth at the end of a year.

166. Geschelin, A. I.: Zur Klinik der bösartigen Geschwülste der Nebenhöhlen der Nase. Primärer Krebs der Stirnhöhle, Zhur. ushn., nos. i gorl. bol. **12**: 429, 1935; abstr., Zentralbl. f. Hals-, Nasen- u. Ohrenh. **26**:172, 1936.

167. Satake, T.: Zur Kasuistik der Carcinoms der Stirnhöhle, Otologia (Fukuoka) **8**:430, 1935; abstr., Zentralbl. f. Hals-, Nasen- u. Ohrenh. **25**:38, 1935.

168. Levesque, L., and Ganducheau, R.: Traitement radichirurgical des tumeurs de l'ethmoïde, Arch. d'électric. méd. **43**:121 (March-April) 1935.

169. Calvert, R. R.: Malignancy of the Sphenoid Sinus, Tr. Indiana Acad. Ophth. & Otolaryng. **19**:19, 1935.

SURGERY

Ferris Smith [170] presented before the Royal College of Surgeons a detailed description of a radical operation on the frontal and ethmoid sinuses practiced by himself in 500 cases, together with the indications for operation and his results. In the discussion which followed, A. Lowndes Yates made a distinction between open and closed sinusitis. Open sinusitis rarely requires more than conservative treatment. Irrigation should be tried in cases of closed sinusitis, and if this is unsuccessful radical operation must be employed, as half-way measures will not suffice. Layton recommended conservatism. He finds that disease of the maxillary sinus causes swelling in the hiatus with secondary involvement of the fronto-ethmoid system. Many cases of disease of the fronto-ethmoid sinuses can be cured by proper attention to the antrum. Also, if it is necessary to free the middle turbinate bone, it is wise to make a mucous membrane flap to prevent contraction of the scar tissue. Gill-Carey has been doing the external radical operation for six years but finds trouble in keeping the nasofrontal pathway free. Also, many of his asthmatic patients had recurrences after temporary relief. Howarth does not favor radical exenteration of the mucosa from the frontal and ethmoid sinuses. Wherever possible, he favors leaving the mucosa of the ethmoid sinus as a starting point for regeneration of the lining of the cavity. His results since using skin grafts have been better than previously. Russell likes the Smith operation but preserves the nasofrontal duct by removing the bone without disturbing the mucous lining in this region. Howells also favors preserving as much of the mucous membrane as possible. Furthermore, he does not like the Caldwell-Luc operation and is satisfied with less radical measures in most cases. Watson-Williams finds few indications for the external operation and has obtained satisfactory results with intranasal procedures. Tilley doubts that his patients would submit to external radical operation on the sinuses without general anesthesia. In the majority of cases he feels that less radical measures will accomplish the desired results.

Wagner [171] gives his patients ethylene followed by ether and uses the external radical fronto-ethmosphenoid approach outlined by Lynch. This is followed by a transantral sphenoid approach. This makes possible the complete exenteration of all sinuses, including their mucous membrane lining. The antrum is packed and drained into the nose, the gingival incision being closed. The ethmosphenoid space is also packed, and a rubber tube is inserted into the frontal sinus. The packs

170. Smith, Ferris: Management of Chronic Sinus Disease—Conservative or Radical? J. Laryng. & Otol. **50**:604 (Aug.) 1935.

171. Wagner, W. A.: Pansinusectomy, South. M. J. **28**:324 (April) 1935.

are removed in twenty-four hours, the tube remaining in from three to four days. This is followed by bougienage to keep the nasofrontal passage open.

Sewell [172] considers the development of methods of successful ligation of the ethmoid and sphenopalatine arteries as the most important advance in the external operation.

Faulkner [173] favors conservative treatment in cases in which the infection fails to clear up after the acute stage. He believes in trying such local measures as displacement irrigation, vaccines, diathermy and infra-red rays. Should such treatment fail, in cases of chronic infection, he advises thorough appraisal of the pathologic process before trying surgical measures. Should metastatic phenomena be present and the antrum show a pathologic process, one should not hesitate to perform a radical operation. In case of doubt as to the extent of the pathologic process present, he advises exploratory trephining of the canine fossa and direct inspection with the nasopharyngoscope. Also, in connection with the disease of the frontal and ethmoid sinuses, one must be guided not only by the degree of the local pathologic process but by the extent of the metastatic phenomena as well.

Simpson [174] recommends attacking the ethmoid sinuses through a radical opening in the antrum if inspection of both sinuses at the same time is required. He finds burs and rasps messy and prefers to use curets and punch forceps.

Hughes [175] believes that radical surgical measures are indicated for only 2 conditions, namely, necrosis of the bone and new growth. He performs the window operation on the antrum and uses packings of iodoform gauze and a powder containing iodine in the postoperative care. Failure often results because the opening is too small and too high. If the radical operation is done, one must remove the lining completely. Hughes prefers the Lynch technic for radical operation on the frontal sinus and uses it only if there is evidence of necrosis of the bone or intracranial complications.

Hajek [176] is convinced that there is need for more conservatism in operative procedures on the sinuses. Radical procedures on the frontal

172. Sewell, E. C.: Operative Treatment of Nasal Sinus Disease, Surg., Gynec. & Obst. **60**:588 (Feb.) 1935.

173. Faulkner, E. R.: Conservative and Radical Surgical Methods of Treatment, Tr. Am. Laryng., Rhin. & Otol. Soc. **41**:88, 1935.

174. Simpson, W. L.: Diagnosis and Treatment of Sinusitis, South. M. J. **28**: 458 (May) 1935.

175. Hughes, W. L.: Treatment of Chronic Sinusitis, New Orleans M. & S. J. **87**:530 (Feb.) 1935.

176. Hajek, M.: Kritische Betrachtungen über die Indication für die conservative und radikale Behandlung bei den entzündlichen Erkrankungen der Nebenhöhlen der Nase, Wien. med. Wchnschr. **85**:705 (June 22) 1935.

sinuses are indicated only in the presence of intracranial complication. Persons with chronic ethmoiditis can and should be operated on intranasally. The external operation should be done if this fails or if there is pansinusitis which necessitates complete exenteration.

Williams [177] studied the postoperative course of 200 patients whose maxillary sinuses had been operated on by the intranasal route. Of 123 who were reached by the questionnaire, 84.6 per cent reported having "received complete symptomatic relief." In analyzing the causes for dissatisfaction, in the minority, he found the error in 7 to be due to failure to recognize a specific hypersensitiveness. In 4 cases bronchiectasis was present, which suggests the possibility that sinusitis may have been the result rather than the cause. In 6 cases closure of the window resulted in failure. Other causes of failure were osteomyelitis, misdirected therapeutic procedures, concurrent infection of other sinuses and open alveolar fistulas. The author believes that the good results obtained in the large majority of cases are due to adequate and permanent drainage plus removal of diseased tissue. "Failure to remove the mucoperiosteal lining of the sinus does not militate against a good result." Hempstead's modifications of the Mikulicz and Caldwell operations meet all requirements.

The records of the Lahy Clinic, as reported by Hoover,[178] show that in 90 per cent of the cases of infection of the maxillary sinuses the condition was the result of infection of the upper respiratory tract and that in 10 per cent it was of dental origin. Hoover advises opening an acutely infected sinus if satisfactory progress is not made after three weeks of conservative treatment. "In a few very severe cases of acute sinusitis with marked prostration it has been necessary to make a temporary opening in the inferior meatus on the second or third day of the infection." In doing the Caldwell-Luc operation the author uses a triangular incision, as it affords more working room. The periosteum is later carefully approximated.

Hall and Thomas [179] are extremely pessimistic as to the value of intranasal surgical procedures and state that "we have our first case of intranasal window resection to see in our own practice and from the practice of men doing this type of work, an antrum that we could call healed." They claim that nothing is accomplished by this method that cannot be obtained by irrigation. The criteria of the healed state are

177. Williams, H. L.: Intranasal Operation for Chronic Maxillary Sinusitis: End-Results in Two Hundred Cases in Which the Principles of Kuster Were Employed, J. A. M. A. **105**:96 (July 13) 1935.

178. Hoover, W. B.: Maxillary Sinusitis: A Brief Discussion and a Few Points in Technique, S. Clin. North America **15**:1603 (Dec.) 1935.

179. Hall, S. S., and Thomas, H. V.: Chronic Maxillary Sinus Disease in the Adult, West Virginia M. J. **31**:249 (June) 1935.

disappearance of local and tracheobronchial symptoms, absence of residual systemic symptoms and a normal x-ray picture. However, the last-named criterion does not hold good, because in a series of 1,500 cases in which operation was performed none of the postoperative roentgenograms were normal.

Rudakow [180] believes that inspection of the interior of the antrum is necessary before determining the type of surgical procedure required. He advises the vertical incision to avoid damage to the nerves and vessels. He exposes the pyriform margin and strips the mucosa from the inferior meatus. The antrum is entered below the inferior turbinate; if necessary, the pyriform border is removed. Sufficient bone is removed to permit inspection. If radical operation is required, the Denker method should be used. If less radical surgical measures are sufficient, the author recommends the Clavue or Lathrop procedure. In any case, it is easier to make a mucous membrane flap through this incision than by any other method.

A résumé of the material seen at the Budapest University Hospital during the past eleven years is reported by Ipolyi.[181] The maxillary sinus was punctured in 1,413 cases with positive results. Cure was effected as follows: by irrigation in 921 cases (65 per cent); by intranasal window operation in 320 cases (23 per cent) and by radical surgical measures in 167 cases (12 per cent).

Thorburn and Ratazzi [182] also present a statistical study. Of 508 cases of maxillary sinusitis observed at the Edinburgh Royal Infirmary, in 35.5 per cent the condition was acute and in 64.5 per cent chronic. The percentage of error in their diagnostic methods is illustrated by the following figures: With transillumination, the percentage of error in cases of acute infection was 21 and in cases of chronic infection, 19; with roentgen examination the percentage of error in cases of acute infection was 21.6 and in cases of chronic infection, 13; with transillumination plus roentgen examination the percentage of error in cases of acute infection was 5.4 and in cases of chronic infection, 7.3.

The results of conservative treatment are tabulated thus (in percentages):

State of Infection	Cure	Improvement	In Statu Quo
Acute complicated	57.0	4.7	38
Acute uncomplicated	54.0	20.0	26
Chronic complicated	9.4	4.7	86
Chronic uncomplicated	34.0	11.4	54

180. Rudakow, W. O.: Mein Verfahren der Operation an der Highmorshöhle, Ztschr. f. Hals-, Nasen- u. Ohrenh. **39**:92 (Dec.) 1935.

181. Ipolyi, F.: Die Indicationen der chirurgischen Therapie der Kieferhöhlenentzündungen, Orvosi hetil. **79**:154 (Feb. 9) 1935.

182. Thorburn, I. B., and Ratazzi, L. L.: Maxillary Sinusitis: A Statistical Investigation, J. Laryng. & Otol. **50**:185 (March) 1935.

An intranasal window operation was done in 48 cases of acute infection and in 147 cases of chronic infection with the following results (in percentage):

State of Infection	Cure	Improvement	In Statu Quo
Acute complicated	53.0	33.0	14.0
Acute uncomplicated	77.0	23.0	...
Chronic complicated	33.3	37.0	29.4
Chronic uncomplicated	34.5	32.7	32.7

A radical operation was done in 67 cases of chronic infection. Cure was obtained in 23 per cent of the group with complications and in 64 per cent of the group without complications. In 76 of 86 cases in which radical operation was performed the artificial opening remained patent. In 25 per cent of the cases in which cure was not obtained the antral opening was found to have closed. The author states that in the past ten years the intranasal operation has been gradually supplanting the radical procedure.

Ziegelman [183] feels that in the majority of cases of sinusitis the intranasal window operation is sufficient. He believes in preserving the mucous membrane because of the ciliary activity which is maintained even when the membrane is disabled. In 62 per cent of the cases dependent drainage is only partially effective because the position of the floor of the sinus is lower than the floor of the nose—therefore, the necessity of having functioning cilia. Wherever it is necessary to inspect the antrum the author advises the nasomaxillary opening (Canfield), which is based on the surgical anatomy of the sinus and usually remains patent.

Segura [184] is opposed to the complete removal of antral mucosa except under extreme conditions. He advises careful direct inspection of the membrane and treatment according to the degree of the pathologic process. The changes seen at operation are divided into three groups: 1. Smooth velvety thickening with a tendency to edema rather than to fungoid or polypoid formation. This type requires only a large enough opening for drainage and ventilation. The mucosa should not be touched. 2. Extensive tumefaction, superficial proliferations and a tendency to the formation of fungoid masses, particularly on the floor and about the ostium. The periosteal layer, however, is well adherent to the bone. In a case of this type the polypoid masses should be removed with a forceps rather than with a curet, to avoid traumatizing

183. Ziegelman, E. F.: A Constructive Critical Analysis of Maxillary Sinus Surgery, Surg., Gynec. & Obst. **61**:388 (Sept.) 1935.

184. Segura, E. V.: Critero con que debe ser tratada la mucosa de los senos paranasales en las intervenciones por sinusitis cronicas, An. de oto-rino-laring. di Uruguay **5**:5, 1935.

the bone. Mucosa that is adherent should not be stripped off. 3. Mucosa degenerated into polypoid and fungoid masses occupying the greater part of the cavity and tending to bleed on manipulation. Frequently subperiosteal collections of pus are seen with some degree of osteitis. This type requires complete and careful exenteration. In any case the author favors the Caldwell-Luc to the intranasal operation because it affords a better opportunity for direct inspection and study of the mucous membrane.

Buzoianu [185] favors the Denker operation as modified by Le Mee because it affords better inspection of the cavity and makes the postoperative care less difficult than the Caldwell-Luc operation. He also claims that it is easier to make a proper mucous membrane flap by this method because the pyriform margin is removed and the inferior meatus is more accessible.

Strack [186] has had 18 cases in which a fistula persisted after radical operation on the antrum. He believes that dental infection is a predisposing factor and must be eliminated, else the operation for closing the fistula will fail. Also, one must be sure that the infection of the antrum is completely cured.

Seyffarth [187] describes a case in which the Denker operation was performed for a cyst and chronic maxillary sinusitis and a large fistula was left which resisted several attempts at closure. It extended from the septum to the left premolar and was 1 cm. in height. The fistula was finally closed by bringing down a flap of mucous membrane from the cheek, turning it inward and dissecting a flap upward from the alveolar process, the two flaps overlapping with raw surfaces apposed. The upper flap was sutured to the cut margin of the alveolus from which the lower flap was taken, this lower flap being turned up to cover the raw surface of the cheek. A wire suture was pulled through the alveolar process at the level of the cuspid and brought out through the nasolabial fold. It was secured over rubber tubing at both ends. This insured perfect approximation of the flap until healing was complete.

Sauvlet [188] presents a dissertation on fistulas of the antrum and reviews the symptoms and complications and postulates the requirements for adequate and permanent closure. The operation he describes

185. Buzoianu, G.: Procedeul Unghiului in cura radicala a sinusitelor maxilare cronica pio-fongoase, Spitalul **55**:227 (June) 1935.

186. Strack, L.: Kieferhöhlen-Mundfisteln nach Kieferhöhlenoperationen und ihr plastischer Verschluss, Ztschr. f. Laryng., Rhin., Otol. **25**:379, 1935.

187. Seyffarth, O.: Nahtsicherung bei der Operation grosser Nasen-Kieferhöhlenmundfisteln durch Lippen-Gaumendrahtnaht, Ztschr. f. Laryng., Rhin., Otol. **25**:402, 1935.

188. Sauvlet, H.: Beitrag zum Verschluss chronischer Antrum-Mundhöhlenverbindungen, Inaug. Dissert., Cologne, 1935.

embraces complete denudation of the tract and the dissection of a triangular flap of mucosa with its base lying in the fold. After its epithelial covering is removed, the flap is carried into the fistula without tension and sutured in place. The area from which the flap is taken is closed by undermining and approximating its borders. Tampons of iodoform gauze are changed every forty-eight hours for a period of eight days. Six weeks after operation the antrum is irrigated to remove old blood clots.

Meyer [189] attempted to answer the question as to the effect of the radical operation on the antrum on the vitality of the teeth by doing the operation on an ape and six months later killing the animal. A careful histologic examination of the teeth revealed no pathologic changes. The pulp was everywhere intact and healthy. The author claims that one need not fear for the vitality of the teeth if the window is placed high and the mucosa of the floor is left alone.

When the root of a tooth is broken off during extraction and either remains in the socket or is pushed into the antrum, Lindenbaum [190] advises against either enlarging the alveolus or doing a Caldwell-Luc operation. He suggests making a trapezoid incision on the outer surface of the alveolus and raising a flap which is reflected upward, thus exposing the bone. The bone of the outer aspect of the alveolus is resected, exposing the tooth socket. The broken-off root and granulations are removed, and the flap is then sewed back in place.

Schröder's [191] inaugural dissertation covers the subject of damage to the teeth following a Caldwell-Luc operation. He lists the possible sources of injury as follows: In cutting through the periosteum all branches of the infra-orbital nerve and artery flowing downward are severed; in resecting the anterior wall the superior and middle alveolar nerves and corresponding arteries are cut; removal of the anterior wall may damage the roots of the teeth directly, and removal of the antral mucosa may damage the dental plexus and vascular system. As a result, there may be sensory and nutritional disturbances of certain teeth. Thirty-seven cases were investigated postoperatively, and 210 teeth were examined: in 35 there was partial or complete anesthesia affecting the cuspids and bicuspids, particularly the former. Other studies showed that the Denker operation was followed by disturbed

189. Meyer, W.: Der Einfluss der radikalen Kieferhöhlenoperation auf die Vitalität der benachtbarten Zähne, Deutsch. Zahn-usw. Heilk. **2**:434, 1935.

190. Lindenbaum, L. M.: Zur Frage operativer Eingriffe zur Entfernung von im die Kieferhöhle bei Zahnextraktionen durchstossenen Zahnwurzeln, Zhur. ushn., nos. i gorl. bol. **12**:420, 1935; abstr., Zentralbl. f. Hals-, Nasen- u. Ohrenh. **26**: 224, 1936.

191. Schröder, K.: Schädigungen am Zahnsystem nach Kieferhölen-Radical-Operationen (Luc-Caldwell), Inaug. Dissert., Leipzig, 1934.

sensation of the teeth on the entire side; the Sturmann operation affected the incisors mainly. However, despite anesthesia, the author never found that radical operations impaired the vitality of the teeth.

Gergely [192] tried Seiffert's method of ligating the internal maxillary artery in 6 cadavers and proclaims it wholly feasible. When the posterior wall of the antrum is removed the origin of the infra-orbital artery is used as a landmark. The ligation may be done either proximal or distal to the origin of the infra-orbital artery.

Marsh [193] reports 3 cases of abscess of the septum following intranasal operations on the sinuses, 2 on the antrum and 1 on the antrum and sphenoid sinus. The abscesses appeared on the sixth, seventeenth and sixth day, respectively. The author considers the possible methods of development of the infection in such cases and suggests the following: (1) damage to the septum during the operation; (2) invasion by way of lymphatics; (3) invasion subperiosteally across the nasal floor, and (4) exacerbation of an infection of the sphenoid sinus and invasion forward from the posterior part of the septum.

Garzoni [194] performed an external operation on the frontal sinus of a man with a chronic infection which left a deep depression in the ridge and a persisting fistula. A subsequent operation disclosed a communication with the other frontal sinus, which was operated on in the same way. The wounds healed perfectly but left a bad deformity, which the author overcame by the injection of liquid petrolatum. He presents photographs illustrating the cosmetic result.

De Rezende [195] believes that failure to obtain permanent cures following operation on the frontal sinuses is frequently due to disregard for the normal defense mechanism of the tissues against infection. He stresses the importance of preserving functioning mucosa. One of the greatest bars to permanent cure is the cicatricial contraction of the duct and the shutting off of portions of the sinus by partitions of scar tissue and areas of destroyed epithelium. The author favors conservatism wherever possible.

Anderson [196] also attributes failure in operation on the frontal sinuses to insufficient widening of the nasofrontal duct. He calls attention to

192. Gergely, Z.: Transmaxillary Ligature of the Anterior Maxillaris Interna (Seiffert's Method), Acta oto-laryng. **22**:142, 1935.

193. Marsh, F. D.: Abscess of the Nasal Septum Complicating Endonasal Operation for Antral Suppuration, J. Laryng. & Otol. **50**:907 (Dec.) 1935.

194. Garzoni, J.; Castañeda, B., and Gomes Veiga, M. O.: Sinusitis frontal doble curada (operación de Killian), Rev. méd. latino-am. **20**:1114 (July) 1935.

195. de Rezende, M. O.: Sobre a questao da cura cirurgica das sinusitis frontais cronicas como evitar os resultadis deceptionantes, Rev. oto-laring. de São Paulo **3**:346 (July-Aug.) 1935.

196. Anderson, C. M.: Some Observations on the Intranasal Operation for Frontal Sinusitis, Minnesota Med. **18**:744 (Nov.) 1935.

the necessity of removing the agger cells and the uncinate, bullar and anterior end of the middle turbinate bone as well as the high-lying anterior ethmoid cells in order to form a smooth sloping cavity in the region of the duct. Roentgenograms should be a sufficient guide for direction as well as for identification of a fronto-ethmoid cell which frequently forms the floor of the frontal sinus, for which it is mistaken, and the roof of which must be broken through if the frontal sinus is to be adequately drained.

Fraser [197] presents a technic for external operation on the frontal sinus which appears similar to the Lynch method. Through a Killian incision the periosteum is retracted from the floor of the frontal sinus and the frontal process of the superior maxillary bone. The floor of the frontal sinus is removed as well as the lacrimal bone and the lateral mass of the ethmoid bone. The mucosa of the frontal sinus is left in situ except for the portion removed with the floor. Iodoform gauze is packed into the cavity and carried down to the nasal aperture. The author uses neither a skin graft nor a rubber tube. The packing and sutures are removed in forty-eight hours.

Good [198] has had uniformly good results with his rasp in the intranasal operation on the frontal sinus and cites only a few complications in a series of 300 cases, viz., fracture of the lamina papyracea (1 case), orbital cellulitis (1 case), penetration of the orbit by the rasp (2 cases), hemorrhage into the orbit or the lids (a few cases) and frequent edema and ecchymosis of the lids. He finds it unnecessary to remove the middle turbinate bone. The rasp is used only in cases of chronic infection. It is moved forward in order to avoid traumatizing the mucosa on the posterior wall of the duct. The intranasal operation is recommended in all cases of chronic infection except in the presence of one of the following conditions: (1) tumor, (2) meningitis, (3) abscess of the brain, (4) thrombosis, (5) osteomyelitis, (6) orbital abscess and (7) extradural abscess or signs of irritation. "Orbital abscess with pus between the sinus and periosteum can be simply drained externally and when the inflammatory symptoms have subsided the intranasal operation will usually allow the fistula to close."

Sjöberg [199] reports from the Sabbatsberg Clinic that they have been doing the Bárány operation for frontal sinusitis during the past few years with good results.

---

197. Fraser, J. S.: Results of External Operation, J. Laryng. & Otol. **50**:693 (Sept.) 1935.

198. Good, R. H.: Frontal Sinusitis: Conclusions Arrived at from Over Three Hundred Intranasal Operations, Laryngoscope **45**:389 (May) 1935.

199. Sjöberg, A. A.: Stirnhöhlenentzündung, Nord. med. tidskr. **9**:337, 1935.

Faulkner [200] recommends the Jansen or the Lynch operation for small frontal sinuses and the Killian operation for large sinuses. In doing the Killian operation he finds that a double incision assures a less conspicuous scar and gives readier access to the remote recesses of the sinus. One incision is made through the lower part of the eyebrow, and the other parallels it an inch above the supra-orbital ridge in one of the natural folds of the forehead. Since the intervening bridge of soft tissue is undisturbed, there is less danger of subsequent necrosis and less deformity.

Hajek [201] states that the external operation on the frontal sinus is indicated in cases of chronic infection if the bone is involved. He is not satisfied with the Killian technic and offers his own method, which consists of a large opening into the sinus at the median upper angle of the orbit, which is kept open until the patency of the duct is well established. The process may take months, but the results are excellent from both the pathologic and the cosmetic standpoint. He claims that this method of simple window drainage is applicable in all cases of chronic infection, even those in which there is limited involvement of the bony orbital wall. However, if the mucosa is entirely necrotic or the bony walls are widely involved, nothing less than extreme measures will avail, such as the Kuhnt or the Riedel technic with obliteration of the sinus.

Precechtel [202] describes a case in which after a Killian operation there were repeated recurrences due to granulations developing in an abnormally large temporal recess. To bring about a cure, he removed the orbital bridge and brought down a flap of temporal muscle, which he sewed into the gap, thus obliterating the dead space.

Daito [203] evidently never heard of Ferris Smith or Sewell, as he describes a radical operation on the fronto-ethmosphenoid sinuses which parallels their technic in almost every detail, even to the mucous membrane flap. He mentions numerous European authors but fails to cite anything from the American literature.

---

200. Faulkner, E. R.: The Present Status of Radical Sinus Surgery, Laryngoscope **45**:782 (Oct.) 1935.

201. Hajek, M.: Meine Erfahrungen über die Behandlung der Stirnhöhleneiterungen, Orvosi hetil. **78**:1099 (Dec. 1) 1934; abstr., Zentralbl. f. Hals-, Nasen- u. Ohrenh. **24**:356, 1935.

202. Precechtel, A.: Muscle Plastic of the Temporal Recess of the Frontal Sinus in Chronic Suppurative Inflammation, in Kubo, Ino: Festschrift zu seinem 60. Geburtstag, Tokyo, The Herald Press, Ltd., 1934, p. 152; abstr., Zentralbl. f. Hals-, Nasen- u. Ohrenh. **25**:269, 1935.

203. Daito, T.: Poly- und Pansinusektomie bei heftigen Erscheinungen durch chronische Nasen-Nebenhöhlenentzündungen, Arch. f. Ohren-, Nasen- u. Kehlkopfh. **139**:300, 1935.

Ferris Smith [204] shows how to use his inflatable flat rubber pad to hold a Thiersch graft in place in order to cover the exposed periorbita and the cut edge of the nasal bone in the external operation.

Wein [205] stresses the importance of the agger nasi for adequate approach to the anterior ethmoid cells and insists that it should be opened as the first step in an operation on the ethmoid sinus. He recommends making a mucous membrane flap with the base downward before chiseling into the agger nasi. He uses a long West chisel for the latter.

NONSURGICAL THERAPY

In discussing prophylactic treatment of sinus infections, both Formby [206] and Ashley [207] stress the importance of removal of nasal malformations, obstructions and infected teeth. Formby also suggests breathing exercises, singing and the use of autogenous vaccines. In order to prevent the suppurative stage of acute rhinitis, he advises that the patient be kept in bed during the infectious stage. A saline purge should be administered, and acetylsalicylic acid and powder of ipecac and opium are the most suitable drugs to give. Inhalations of preparations of menthol, benzoin and eucalyptus are efficacious. If the nasal airway is not cleared by these procedures, a weak solution of ephedrine should be applied. The application of infra-red rays to the nose and sinuses is sometimes used. If suppuration has set in, Formby recommends the use of packs moistened with a 5 per cent solution of cocaine—to which 1 per cent ephedrine may be added—every four hours and the inhalation of a spray of chlorbutanol between treatments or of a nasal oil containing menthol and yellow mercuric oxide. Lavage is recommended only if the sinuses are blocked. Ashley has had good results with a mixture of colloidal silver and isotonic neosynephrin hydrochloride applied on packs. He claims that the latter is twelve times as effective in producing ischemia as other agents and that its action is three or four times as lasting. He states that "all colds in their primary stage are allergic manifestations: that the allergy develops due to the presence of a filtrable virus made active by failure of the body to accommodate itself to unfavorable climatic and physiological changes; that the purulent stage is due entirely to secondary invaders and that any serious complications are due to these secondary invaders."

---

204. Smith, Ferris: Addition to the Complete Operation on the Fronto-Ethmo-Sphenoid Sinuses, Arch. Otolaryng. **22**:184 (Aug.) 1935.

205. Wein, Z.: Der Agger nasi als Schlüssel zum vorderen Siebbeinlabyrinth, Monatschr. f. Ohrenh. **69**:1085 (Sept.) 1935.

206. Formby, M. L.: Preventive Measures in Nasal Sinus Therapy, M. Officer **54**:5 (July 6) 1935.

207. Ashley, R.: Prophylactic Treatment of Chronic Sinusitis, Tr. Pacific Coast Oto-Ophth. Soc. **23**:14, 1935.

Schatz [208] for a number of years has had excellent results in the treatment of recurrent infections of the antrum by following his irrigation with saline solution with sufficient insufflation of air to dry out the residual fluid and then instilling ½ drachm (1.84 cc.) of a 10 per cent solution of silver nucleinate. After the third treatment he begins using a weak solution of silver nitrate (3 drops [0.186 cc.] of a 10 to 12 per cent solution in 1 ounce [29.57 cc.] of distilled water). "This is forced into the sinus about one-third at a time. The patient is instructed to throw the head backward, to one side and then to the other and finally forward. These postures are intended to bring the solution into contact with each of the walls of the sinus. The procedure is repeated after each portion of the ounce is injected. No attempt is made to blow out the final amount of solution that remains." The strength of the solution is increased every forty-eight hours by 1 drop (0.062 cc.) until a concentration of 7 drops (0.43 cc.) to the ounce is reached. This seems to be the usual limit of tolerance. If the silver nitrate is not tolerated, the author advises the use of a 5 per cent solution of aluminum acetate.

Mithoefer [209] attaches great importance to a study of the patient's constitution, hygiene and endocrine and intestinal function. He firmly believes that disturbances along these lines must reflect themselves in impairment of the ciliary function as well as of the activity of the mucous glands.

Lillie [210] expresses substantially the same views. He again calls attention to the bad effects of prolonged frequent irrigation of the nose and sinuses because of the tendency to water logging of the mucous membrane.

Howarth [211] finds a difference in the severity of acute infections, depending on the character and virulence of the infective agent. In 1931 he observed an unusually large number of cases of severe infection; in 5 of them death occurred from an intracranial complication. An emergency operative procedure is necessary only when pain and fever indicate obstruction to drainage. Such a procedure should be restricted to the evacuation of pus. In all other cases the usual measures for inducing intranasal ventilation and drainage are used. Howarth favors the administration of large doses of alkalis by mouth.

---

208. Schatz, H. A.: Non-Surgical Treatment of Recurrent (Chronic) Nasal Sinusitis, M. Rec. **141**:28 (Jan. 2) 1935.

209. Mithoefer, W.: Non-Operative Treatment of Nasal Sinus Disease, Surg., Gynec. & Obst. **60**:587, 1935.

210. Lillie, H. I.: Chronic Suppurative Sinusitis: A Point of View as to Treatment, Arch. Otolaryng. **21**:272 (March) 1935.

211. Howarth, W.: Acute Inflammatory Conditions of the Nasal Accessory Sinus, Lancet **1**:391 (Feb. 16) 1935.

During the past ten years Lieschke [212] has found it unnecessary to resort to frequent lavage of the antrum. He irrigates, dries the sinus by insufflating air and then fills it with a 10 per cent of iodoform in glycerin. This treatment may be repeated in eight days. He has rarely found it necessary to repeat it a third time. The only other supportive treatment is heliotherapy. He has never seen any reaction to iodine, and since using this treatment he has rarely seen any cases in which a radical operation on the antrum was necessary.

In cases of acute and subacute infection of the maxillary and the sphenoid sinuses Prenn [213] aspirates the secretions through a cannula. If the secretion is too thick to pass, he injects an alkaline solution or uses an inhalation of ethyl iodide to facilitate its passage. When it has all been removed he injects dilute solution of sodium hypochlorite, lets it remain a while and then draws it off. Two or three such treatments are usually sufficient. For the hyperplastic type of sinusitis he uses mild protein silver instead of the solution of sodium hypochlorite.

Weill [214] is enthusiastic over displacement and suction treatment. In cases of acute infection he is satisfied with suction alone preceded by shrinkage, and in cases of subacute and chronic infection suction and displacement are employed daily at intervals of from two to three days.

Gundrum and Semenov [215] used the Proetz technic in treating 150 persons with chronic ethmoiditis. Treatments were given twice weekly, with a 0.5 per cent solution of ephedrine in physiologic solution of sodium chloride. Fifty-two per cent of the patients were definitely improved within two months. Sixteen patients with refractory infections were then treated by instillation of a stock bacterial antigen prepared by the Besredka method. Seventy per cent improved after the addition of the filtrate to the ephedrine solution. The authors noted irritation and reactions from the local use of the vaccine and recommend beginning the treatment with antigen of half strength. Subsequently they treated 135 patients with combined ephedrine and antigen, obtaining relief in 64 per cent. This form of treatment is indicated particularly in cases of subacute infection in which there are excessive congestion and mucoid or mucopurulent secretion and in cases of low grade catarrhal states.

---

212. Lieschke: Drei Kniffe aus der Praxis, Ztschr. f. Hals-, Nasen- u. Ohrenh. **38**:213, 1935.

213. Prenn, J.: Some Features in Sinus Operations and Therapy, Laryngoscope **45**:452 (June) 1935.

214. Weill, G. A.: L'aspiration dans les sinusites, Oto-rhino-laryng. internat. **19**:202 (April) 1935.

215. Gundrum, L. K., and Semenov, H.: The Treatment of Sinusitis by the Displacement Method, Using Ephedrin and Bacterial Antigens, Laryngoscope **45**: 858 (Nov.) 1935.

Kaplan [216] gives an elaborate classification of rhinosinusitis according to the etiology and symptomatology and points out methods of treatment. Among the numerous therapeutic measures mentioned are the use of the bacteriophage by the Proetz method in cases of chronic nonhyperplastic sinusitis, the injection of from 60 to 80 per cent alcohol with 2 per cent procaine hydrochloride into the area of the inferior turbinates preliminary to removal of polyps in cases of the hyperplastic type, the use of a powder spray of methylaminoketone (a synthetic epinephrine-like drug) and boric acid in cases of allergic sinusitis for relief when the allergen cannot be demonstrated and the application of a 5 per cent solution of silver nitrate to the tips of the turbinates in cases of simple hyperesthetic rhinitis.

Solis-Cohen [217] believes that too much attention is paid to cleaning out the original focus and too little to combating the infecting bacteria and their toxins which persist after operation. Nature must be aided with the use of a potent vaccine. He employs a pathogen-selective vaccine made from cultures taken from all the available secretions. Before giving the vaccine he makes three simultaneous intracutaneous tests with 0.05 cc. of the diluted vaccine, representing, respectively, 10,000 organisms, 1 organism and 0.0001 organism. The initial dose is based on the reactions to these tests. Subsequent doses depend on the reactions and the rate of improvement from the symptoms.

O'Malley [218] discusses the physiology of the antral mucosa, particularly the problem of ventilation and ciliary activity. He uses a patency tester (small tambour) for determining the prognosis when undertaking treatment. If it shows positive and negative phases, the prognosis is good. Also, he determines the patency of the ostium by puncturing the sinus without preliminary shrinkage. If there is resistance to the escape of the fluid, he applies cocaine and epinephrine to the middle meatus, and if this procedure then facilitates the passage of the fluid it proves that the obstruction was only vascular and temporary and therefore that the prognosis is good.

Goodyear [219] is opposed to frequent irrigations of the antrum. After four or five irrigations at intervals of from three to four days, 2 cc. of iodized oil is injected and allowed to remain. From seven to ten

---

216. Kaplan, S.: Rhinologic Disorders: A Classification with Appropriate Therapy, M. Times **63**:115 (April) 1935.

217. Solis-Cohen, M.: The Proper Rôle of Vaccines in Chronic Inflation of the Upper Air Passages, Laryngoscope **45**:243 (April) 1935.

218. O'Malley, J. F.: Treatment of Maxillary Sinus Suppuration, Brit. M. J. **2**:1139 (Dec. 14) 1935.

219. Goodyear, H. M.: Chronic Nasal Sinusitis: Evaluation of Opaque Oils in Diagnosis and Treatment; Some Surgical Observations and Results, Ohio State M. J. **31**:591 (Aug.) 1935.

days later the residual oil is removed by irrigation. He finds that patients with prolonged bronchial cough obtain relief from this treatment. The author has also seen patients with retrobulbar neuritis who were surprisingly relieved after the instillation of iodized oil into the sphenoid sinus.

Allison [220] has had good results from the instillation of a 1 per cent solution of optochin hydrochloride in cases in which the pneumococcus was found to be the offending organism.

Bateman [221] presents the histories of 11 patients with acute frontal sinusitis, 7 of whom were cured by simple nonoperative procedures. The routine consisted of puncture and lavage to clear up the usually coexistant acute maxillary sinusitis, the application of packs soaked with a 10 per cent solution of mild protein silver for twenty minutes twice daily and inhalations of steam. In 4 cases external incision was necessary because of a subperiosteal abscess.

Tebbutt [222] conducted experiments on 3 patients whose sinuses were accessible by reason of previous radical surgical procedures and in whom there was no acute infection present at the time of the experiments. Various agents producing heat and cold were applied over the sinus and the intrasinus temperature was recorded. It was found that ice compresses, an icebag, a hot water bottle, an electric heating pad and hot compresses all failed to affect the intrasinus temperature. When the infra-red rays or the high frequency oscillating current were used, there resulted a drop of 1 F. in the temperature of the sinus. This drop is explained as being due to evaporation of the increased nasal secretions resulting from the agents. The author believes that these agents have some value because of this increased discharge, which improves drainage and hastens resolution.

Fishbein [223] reports his results with long wave high frequency medical diathermy in 400 patients (6,500 treatments) suffering from acute or chronic hyperplastic rhinitis, hay fever, asthma or some forms of sinus infection. The infection was chronic in 355 of the cases. The positive electrode consisting of long, narrow (⅜ inch) ribbons of closely woven copper strands with a resistance of 60 milliamperes per square inch were placed in the nose, and the negative electrode was placed on the forehead. The positive electrodes were wrapped in long fiber cotton

---

220. Allison, W. L.: The Treatment of Antral Disease, Pennsylvania M. J. **38**: 241 (Jan.) 1935.

221. Bateman, G. H.: Some Cases of Acute Frontal Sinus Suppuration, J. Laryng. & Otol. **50**:350 (May) 1935.

222. Tebbutt, H. K., Jr.: Effect of Physical Agents on the Temperature of the Nasal Sinuses, Arch. Otolaryng. **22**:733 (Dec.) 1935.

223. Fishbein, J. N., and Staff, E. J.: A Study of Nasal Infections, Rhode Island M. J. **18**:129 (Sept.) 1935.

soaked in 7 per cent solution of mild protein silver with the addition of a small amount of ephedrine and inserted into the middle meatus as far back as the wall of the sphenoid sinus. The dose employed was 300 to 500 milliamperes for from fifteen to twenty minutes. From 6 to 10 treatments were given in each case. The effect of this treatment is to stimulate activity of the mucous glands. Cultures taken before and after treatment demonstrated a reduction of from 70 to 80 per cent in the number of organisms as compared to the results in controls treated without diathermy in whom the reduction was from 10 to 30 per cent. The author believes from the foregoing evidence as well as from supporting evidence in experimental animals that by this treatment sufficient heat is produced in the nose to attenuate or destroy many of the surface organisms.

Köhler [224] recommends the short wave (frequency of 20,000,000 to 50,000,000) in the treatment of both acute and chronic disease of the maxillary and frontal sinuses. He claims that many patients now subjected to surgical measures could be cured by this method. In cases of acute involvement the difference between the usual long wave diathermy and the present short wave is astonishingly marked. The generation of heat is from within outward in contradistinction to the older method. Short wave therapy suppresses the sympathetic impulses and stimulates the vagotonic impulses which leads to more permanent dilatation of the capillaries. The electrodes described by the author are constructed of felt soaked in liquid petrolatum and covered with plaster through which the metal contact is entered. This makes for better application to the individual patient.

Gale [225] has used the ultra short wave in the treatment of 50 patients with chronic sinusitis with excellent results. Among the typical cases cited is that of an adult with a discharge of eight weeks' duration, pain in the cheek and roentgen evidence of infection of the ethmoid and frontal sinuses and pus and polypi. The patient was exposed to 10 milliamperes of 300 watt current daily for forty-five minutes. After four treatments, all the symptoms were relieved. A child with bilateral chronic ethmoiditis and pus in both sides of the nose had been treated by the usual methods for six months without avail. After eight exposures to the ultra short waves, the condition cleared up. At the time the article was written, seven months later, the patient remained cured.

Shorell [226] treated 170 patients (apparently with acute or subacute involvement) with dry heat and obtained cure or marked improvement

224. von Köhler, E.: Kurzwellentherapie bei Affektionen des Gesichts, Schweiz. med. Wchnschr. **65**:395 (April 27) 1935.

225. Gale, E. K.: The Use of Ultra Short Waves in Sinus Therapy, Laryngoscope **45**:520 (July) 1935.

226. Shorell, I. D.: A New Curative Treatment for Sinus Disease, Am. Med. **41**:14 (Jan.) 1935.

in 94 per cent. The heat was applied by running hot water through distensible rubber tubes inserted into both middle and inferior meati. The temperature was kept uniform by pressure regulated at from 1 to 3 pounds (0.5 to 1.3 Kg.). Suction at the other end kept the water circulating. The treatment was started with the water at 112 to 115 F. and it was raised 1 degree every minute and a half until a maximum of 122 to 128 F. was attained. This was maintained for from fifteen to twenty minutes. In addition, the author used autogenous vaccines starting with one containing 25,000,000 organisms. Injections were given from two to three times weekly. Shorell also resorted to the usual shrinkage, suction and the use of vaporized oils.

Hosmer [227] reports on the use of Krueger's vaccine in 50 patients with chronic sinusitis during the past two years. This method was selected when other methods of treatment had failed. Good results were obtained in 62 per cent, fair results in 26 per cent and no improvement in 12 per cent. Cultural data showed the principal bacteria found to be Staphylococcus aureus-haemolyticus, 48; Streptococcus haemolyticus (alpha), 30; Str. haemolyticus (alpha prime), 16, and Haemophilus, 10.

Warren [228] used the method recommended by Butler and Wooley in 72 unselected cases of chronic sinusitis with the following results: marked improvement, 25 per cent; moderate improvement, 40 per cent; transitory improvement, 20 per cent; no improvement, 15 per cent. The greatest benefit resulted in "cases of hyperplasia with or without moderately heavy secretion, radiographically showing a thickened membrane and one that has not had prolonged advanced infection nor repeated operations." A satisfactory response was also obtained in 4 allergic and borderline cases. In cases in which there were cysts or polypi and in which the suppuration was prolonged the treatment failed to produce good results.

Troup [229] reports the case of a man of 30 with chronic pulmonary tuberculosis whose antrums yielded a fluid containing tubercle bacilli. Operation was contraindicated because of the patient's physical condition. He was treated with infra-red rays over the face, ultraviolet rays intranasally, ultraviolet rays from a water-cooled quartz mercury vapor arc lamp postnasally and ultraviolet rays from a titanium alloy arc to

227. Hosmer, M. N.: Chronic Nasal Sinusitis Treatment with Undenatured Bacterial Antigens, California & West. Med. **43**:24 (July) 1935. The vaccine in question was described in an article by Krueger (J. Infect. Dis. **53**:237 [Sept.-Oct.] 1933).

228. Warren, E. D.: Value of X-Ray Therapy in Chronic Sinusitis, Laryngoscope **45**:864 (Nov.) 1935.

229. Troup, W. A.: Tuberculosis of the Nasal Sinuses Treated by Irradiation, Lancet **2**:667 (Sept. 21) 1935.

the entire body. Sixty treatments were given over a period of from six to seven months. All symptoms, local and general, disappeared, the patient was restored to health and vigor and returned to work.

CLINICAL OBSERVATIONS

Fracture.—Woodward [230] contributes a well written article on the subject of fractures. He points out that fracture of the frontal bone involving the sinus is dangerous because of the relationship of the sinus to the brain and the meninges. The important thing to ascertain is whether the posterior wall is involved, because, if so, wide exposure, inspection of the dura and open drainage are required. In any case blood clots and fragments of bone should always be removed. In fracture both of the ethmoid and of the frontal bone the patient should be cautioned against blowing the nose. A transverse fracture through the ethmoid bone and the orbit is treated by wiring or by dental braces fixed to a skull cap. In fracture of the maxilla blood is commonly found in the maxillary sinus. Irrigation should be delayed at least from four to six days because of the danger of secondary infection. It is always important to restore the orbital rim. The author refers to the various methods used for the reduction of dislocated malar bones and zygomatic processes, such as the towel clip method of Gill, the intra-antral method of Shea and the method of Gillies. In many cases the aid of an orthodontist or a surgeon specializing in diseases of the mouth is necessary.

Linn [231] reports a rare case of isolated fracture of the ethmoid bone in a boy as a result of being kicked while playing football. Emphysema of the lids ensued after the patient blew his nose. Roentgenograms showed the line of fracture about ½ inch (1.27 cm.) long through the lateral wall of the ethmoid sinus. The nasal bones, maxilla and cranial bones were uninvolved.

Mygind [232] saw 2 cases of fracture of the skull, one involving the frontal sinus and the other, the frontal and ethmoid sinuses. In one case, meningitis developed at once (28,000 cells), while in the other the symptoms of meningitis were less marked. Both patients were treated by wide exposure of the anterior fossa with removal of the lamina cribrosa, dural incision and drainage of spinal fluid, which was maintained for several days. Both patients recovered.

---

230. Woodward, F. D.: The Management of Recent Fractures of the Nose and Sinuses, Ann. Otol., Rhin. & Laryng. **44**:264 (March) 1935.

231. Linn, F. D.: Fractures Through the Ethmoid Sinus, Memphis M. J. **10**: 15 (Nov.) 1935.

232. Mygind, S. H.: Deux cas de lésion traumatique de la fosse antérieure du crâne avec méningite diffuse guéris après opération (liquorrhée provoquée), Ann. d'oto-laryng., May 1935, p. 560.

In Lawson's [233] case the outcome was not so fortunate. A fracture of the skull involving the frontal sinus, which communicated with the subdural space by a tear in the dura, led to intra-orbital hemorrhage and nasal discharge of cerebrospinal fluid. The areas affected were widely exposed, and an attempt was made to close the dural defect with fascia, but the patient succumbed to meningitis.

General.—Fenton [234] gives a clear picture of nasal infection, beginning with a historical review of early conceptions of etiology and crude methods of treatment as contrasted to the currently accepted views on pathologic processes of the nose and sinuses. The article is instructive and readable and covers diagnosis and modern methods of treatment.

Wilker [235] noted suppurative disease at 144 (6.9 per cent) of 2,072 autopsies; in 57 per cent of the cases the infection was in the antrums. Children under 10 years of age and adults past 80 showed the greatest percentages of incidence. The author could not find any particular preponderance of sinus infection associated with various pulmonary or other visceral diseases which caused the death of the patient. Approximately the same percentages of sinus infection (namely, from 5 to 10 per cent) was found associated with pneumonia, tuberculosis, heart disease, hepatic disease, malignant tumor and diphtheria. The incidence varied in different years. For instance, in 1933, sinusitis was found at 6 (26 per cent) of 23 autopsies. The author's figures reveal a much lower incidence of sinus infection at autopsy than do the older statistics of Fraenkel, Wertheim and Oppikofer.

Belleli [236] tries to correlate the incidence of sinus disease with the stage of development of the sinus. While numerous statistics are given, nothing significant is proved except that the maximum incidence of sinus disease is found in the third decade.

Mayerberg [237] attributes frequency of colds among city dwellers to overheating and drying of the air in the home. He also blames errors in diet and endocrine imbalance.

---

233. Lawson, A.: A Case of Cerebro-Spinal Rhinorrhoea Following Multiple Fracture of the Skull Which Involved the Left Frontal Sinus and Left Orbit, Tr. Ophth. Soc. U. Kingdom **54**:307, 1934.

234. Fenton, R. A.: Modern Views About Nasal Infection, J. Indiana M. A. **28**:12 (Jan.) 1935.

235. Wilker, F.: Statistische Untersuchungen über die Entzündung der Nasennebenhöhlen an Hand von 2000 Sektionsfällen, Ztschr. f. Laryng., Rhin., Otol. **25**: 404, 1935.

236. Belleli, C.: Le sinusite in rapporto all'eta, Gior. di med. mil. **82**:950 (Sept.) 1935.

237. Mayerberg, E. R.: The Nasal Accessory Sinuses from the Standpoint of the General Practitioner, Delaware M. J. **7**:206 (Oct.) 1935.

Headache due to sinus infection is discussed by Deeton [238] and by Babcock.[239] Both attempt to analyze the location and source of headache, pointing out various conditions which may be overlooked. Deeton cites cases in which treatment was given for sinusitis when the headache was due to syphilis or bad teeth.

Maxillary Sinus.—James [240] presents an interesting study of maxillary sinusitis in far off New Guinea and the Solomon Islands. Observation of 60 cases of chronic infection showed extremely variable symptoms, simulating in many instances those of such a condition as tuberculosis, malaria, influenza, malingering or psychosis. The sinus infection was frequently unsuspected for a long time while the patient was treated for pulmonary complaints, neuralgia, toxemia, anemia, disease of the joints, gastro-intestinal disorder or even swelling of the bones of the face, which masked the true condition. The principal symptoms found were headache (69 per cent), asthma (10 per cent), chronic cough (53 per cent), fever (47 per cent), malaise, lassitude and dulness (33 per cent), aural symptoms (15 per cent) and others. Puncture revealed mucus in 13 per cent and pus in 87 per cent of the cases. Cure was obtained in most of the cases by irrigation through an artificial opening made with the Krause cannula. Radical operation was necessary in a few cases.

Infection of the antrum due to alveolar abscess, according to Christiansen,[241] should be treated by adequate intranasal drainage, and the alveolar fistula should be let alone. Rather than curet the socket, it is better to remove the focus by a separate window through the external or labial side of the alveolar bone.

Strong and Barclay [242] report an unusual circumstance, namely, an infection of the antrum due to an apical infection of an incisor tooth in a boy of 15. It seems that the filling in the root canal had penetrated the apex of the root, causing infection and necrosis of the bone all the way up to the antral floor.

In discussing dentigerous infection of the antrum, Schulz [243] distinguishes between true empyema, in which the mucosa of the sinus

238. Deeton, W. L.: Headache of Nasal Origin, Cleveland Clin. Quart. **2**:66 (July) 1935.

239. Babcock, J. W.: The Rôle of Diseases of the Nasal Accessory Sinuses in Headache, Bull. New York Acad. Med. **11**:481 (Aug.) 1935.

240. James, C.: Chronic Maxillary Sinusitis (Suspected and Unsuspected) in the Tropics, Tr. Roy. Soc. Trop. Med. & Hyg. **28**:635 (April 17) 1935.

241. Christiansen, G. W.: The Mouth as a Factor in Maxillary Sinus Disease, J. Am. Dent. A. **22**:1926 (Nov.) 1935.

242. Strong, E. C. N., and Barclay, I. B.: An Unusual Infection of the Antrum of Dental Origin, Lancet **2**:131 (July 20) 1935.

243. Schulz, J.: Roentgenologische und mikroskopische Beiträge zur Frage der dentogenen Sinusitis, Inaug. Dissert., Frankfort-on-Main, 1935.

is the seat of a suppurative process, and pyosinus, in which the sinus acts merely as a reservoir, with secondary reaction of the mucosa. These points are illustrated by case histories, photomicrographs and postmortem specimens. The author believes that true empyema of dental origin does not exist except in the presence of a previous nasal infective focus acting as a predisposing agent or when an alveolar abscess perforates the sinus and discharges a large amount of pus into the cavity. Most of the author's patients were cured by extraction and a few irrigations.

Gerrie [244] states that pathologic conditions of the upper alveolar process account for maxillary sinusitis in 20 per cent of all cases, in most instances the condition being due to surgical procedures about the teeth. The author cautions against the vigorous use of the curet in removing granulations from a tooth socket; neither should a root tip be removed by excavating the socket. It is better to make a flap and remove the overlying bone sufficiently to expose the root properly. "Free socket dressings are dangerous in the presence of an antrum fistula."

Hoepfel [245] finds that when the root of a tooth or some other foreign body is pushed into the antrum the reaction which follows will depend on the virulence of the bacteria introduced. He suggests that a small object may be washed out by irrigation or entangled in gauze strips packed into the antrum through the alveolar fistula and pulled out. Otherwise there is no way of removing the object except through an opening in the canine fossa.

Tenaglia and Guglielmi [246] report that after the removal of the upper premolars in a man of 42 a fistula remained which discharged pus. After roentgenographic studies, a gingival incision was made, which disclosed a cystlike cavity communicating with the floor of the nose, which contained a supernumerary tooth.

Subsequent to puncture and irrigation of an antrum, Bruch's [247] patient complained of feeling ill but recovered after lying down for a few minutes. The other antrum was then punctured, and immediately after the injection of air the patient collapsed, went into clonic spasms, followed by coma and strabismus, and died within eighteen hours. The pathologist could find no demonstrable cause for death at autopsy. He stated that the eighteen hours which had elapsed from the time of the

---

244. Gerrie, J. W.: The Floor of the Maxillary Antrum, J. Am. Dent. A. **22**:731 (May) 1935.

245. Hoepfel, W.: Fremdkörper dentaler Erkunft in der Kieferhöhle, Deutsche zahnärtzl. Wchnschr., 1935, p. 387; abstr., Zentralbl. f. Hals-, Nasen- u. Ohrenh. **25**:88, 1935.

246. Tenaglia, A., and Guglielmi, C.: Quiste de maxilar superior con inclusión dentaria, Semana méd. **2**:1027 (Oct. 3) 1935.

247. Bruch, E.: Der erste forensische Fall von Kieferhöhlenpunktionstod. Ztschr. f. Laryng., Rhin., Otol. **26**:65, 1935.

accident was sufficient for any air in the cerebral vessels to have been absorbed. Professor Lange testified that in his opinion death was due either to air embolus or to shock induced by irritation of the sympathetic and the vagus nerve. Professor Gross attributed the death to the use of too strong a solution of cocaine. The author's opinion was that the puncture was made too far forward, in the region where the bone is thick and where the venous plexus about the lacrimal duct is particularly rich, and that there was a regurgitation of air from the punctured sinus into the open veins on the medial wall.

Griffin [248] and Bounds [249] both contribute articles on acute maxillary infections which follow the usual patterns.

Del Piuno and his co-workers [250] have tried out a method for the treatment of true neuralgia of the second division of the trifacial nerve that is less formidable than resection of the posterior root, namely, resection of the second division by a transantral approach. Through a regular Caldwell-Luc exposure the infra-orbital nerve is located and followed in the roof of the antrum backward to the pterygomaxillary fossa. The infra-orbital nerve is bared by means of dental drills, which uncap its canal. The second division of the nerve is located in the pterygomaxillary fossa and treated according to the method of Thiersch. Six cases are reported in which good results were obtained by this method.

An unusual complication arising from puncture of the antrum is described by Swett.[251] The procedure was immediately followed by pain in the eye, swelling of the lower lid, flashes of light and blindness. Examination of the fundus showed the vessels of the retina to be completely empty. The picture was like that produced by an air embolus of the central vessels. The fundus was watched closely, and soon the arteries took on rapid clonic dilatation and contraction as a column of blood was seen to advance and recede. "This (pulsation) was transmitted to the veins so that the whole disc had the appearance of pulsating." After twenty minutes the pulsation became less as the vessels filled. The vision was still blurred. Thirty minutes later the patient complained of intense pain in the eye and headache. Examination

248. Griffin, H. W.: Some Head Complications of the Common Cold, South. Med. & Surg. **97**:72 (Feb.) 1935.

249. Bounds, G. W.: Acute Infection of Maxillary Sinus or Antrum of Highmore, New Orleans M. & S. J. **87**:612 (March) 1935.

250. Del Piuno, J.; Bergara, R., and Bergara, C.: Abtragung der oberen Kiefernerven auf transsinusalem Wege, bei kryptogenetischer Gesichtsneuralgie, Rev. argent. de otol. **4**:145, 1935.

251. Swett, W. F.: Reflex Spasm Simulating Embolus of the Central Retinal Artery: Secondary Glaucoma Following Antrum Irrigation; Complete Recovery, Am. J. Ophth. **18**:359 (April) 1935.

revealed marked secondary glaucoma (tension, 3 plus) and a hyperemic fundus, both veins and arteries being engorged owing to secondary relaxation of the vessels. The use of massage and hot compresses was continued all day. The next day the tension and fields were normal; vision was 20/20, although blurred, and within three days everything was normal.

Menzel [252] found 4 cases of antrum infection, acute and subacute, all in women, in which the predominant symptoms were those of vasomotor rhinitis, namely, nasal block, profuse watery discharge and severe sneezing. Cure was effected in 3 cases by irrigation and in 1 by operation. The sinuses were filled with mucoid or mucopurulent discharge. The author believes that the symptoms were due to irritation of the sensory nerves by stagnant secretion. Incidentally, all the patients had hyperthyroidism.

Frontal Sinus.—Jordan [253] goes into the subject of frontal headache thoroughly, analyzing the numerous conditions that may cause it. In addition to various local processes accountable for headache, he mentions syphilis, meningitis, glaucoma, periostitis, tumor, neuralgia, alcohol, diabetes and sympathetic otonic hemicrania. He also describes the syndrome of the nasal nerve and that of the sphenopalatine ganglion. In the former the eyes are affected; there may be a corneal ulcer, and there are tenderness at the bony-cartilaginous junction in the septum, swelling of the mucous membrane in the olfactory cleft and secretion in the anterior part of the nose. In the latter the eyes are unaffected; the middle and posterior parts of the nasal cavity are hyperemic, the headaches are deep and diffuse and not localized, and there are no symptoms between attacks. Jordan stresses the importance of removing nasal deformities which keep up the vicious circle of congestion, swelling and neuralgia.

Alonzo Lej [254] discusses the same topic even more in detail, including anatomic, physiologic, neurologic and pathologic considerations. He divides frontal neuralgia into the following types: (1) mechanical, (2) symptomatic, (3) focal, (4) toxic and (5) due to neoplasm. The author takes up much space discussing the origin of the pain and the numerous diagnostic procedures necessary for a correct diagnosis. He stresses the importance of determining first of all whether the sinuses are at fault, and he insists that after all other diagnostic measures have been undertaken, most of which are subject to error, the only certain method

252. Menzel, K. M.: Ueber eine Gruppe akuter Kieferhöhleneiterungen mit rhino-vasomotorischen Syndrom, Monatschr. f. Ohrenh. **69**:1169, 1935.

253. Jordan, R. R.: Der Stirnschmerz und fronto-ethmoidale Prozesse, Rev. méd. del Rosario **25**:945, 1935.

254. Alonzo Lej, F.: Las frontalgias sinusales, Clín. y lab. **26**:128 (Feb.) 1935.

is that of direct catheterization of the sinus with careful examination of the expelled secretions. If a pathologic process is present, the type of operation used will depend largely on the size of the sinus. The author favors an intranasal operation in most cases. If the sinus is very large, he feels that it is best treated by external procedures. The article is long and must be read in the original.

Lugli [255] reports a case of a young woman in whom during a period of two weeks after a cold a fluctuating swelling about the size of an orange developed in the midline of the forehead. Operation was refused, and within three weeks, surprising to relate, the swelling was much reduced and continued to recede until it disappeared spontaneously. A roentgenogram showed a dehiscence in the anterior plate, which could be felt on palpation. The author points out the unusual location of a fistula of the frontal sinus, in most instances such a fistula being near the floor of the orbital wall. (In this particular case it was probably due to enlargement of a microscopic fistula, as described by Ohringer.[23]) The case was also interesting from the point of view of differential diagnosis, since syphilis and osteomyelitis seemed likely, and also from the fact that the fistula healed spontaneously.

Atkinson [256] operated in 3 cases of subacute and chronic frontal sinusitis by the external route. He passed a catheter downward into the infundibulum through the nasofrontal duct and left it in place for from four to twelve weeks. The duct was kept dilated by increasing the size of the catheter from a no. 3 top to a no. 7 English during the course of several weeks. Worms and Leroux-Robert [257] seem to think that vacuum headache is the result of an angioneurosis which is due to a disturbance of the autonomic nervous system. They report 2 cases of severe headache, vomiting and vertigo in which the roentgenograms were not conclusive but when the frontal sinus was opened externally a swollen mucosa with a tendency to edema was revealed. Enlarging the nasofrontal duct relieved both patients.

Barth [258] found typical diphtheria bacilli in the secretion of an empyema of the frontal sinus at operation. He assumes that the infection came by way of the nasofrontal duct and states that there is no record of a similar case in the Clinic of the Charité (Berlin), nor has he ever

255. Lugli, G.: Les sinusites frontales à évolution antérieure, Rev. de laryng. **56**:842 (July-Aug.) 1935.

256. Atkinson, E. M.: Three Cases of Frontal Sinusitis Treated by Harmer's Intubation Method, Proc. Roy. Soc. Med. **28**:1581 (Oct.) 1935.

257. Worms, G., and Leroux-Robert, J.: Oedème aigu angio-neurotique de la muqueuse de l'antre frontal (syndrome de "vacuum sinus"), Ann. d'oto-laryng., June 1935, p. 662.

258. Barth, N.: Diptherie der Stirnhöhle: Kasuistische Mitteilung, Ztschr. f. Laryng., Rhin., Otol. **26**:57, 1935.

heard of one recorded in the literature. The sinusitis was cured by the operation, but the bacilli still persisted in the nasal secretion.

Tzetzu and Stefaniu [259] claim that syphilis of the frontal sinus is extremely rare as compared with syphilis of the maxillary sinus. They report a case in a 20 year old girl in whom a painful swelling developed over the region of the left frontal sinus. Ptosis and swelling of the nasal mucosa were also present, but no pus could be seen. The Wassermann reaction was three plus, and the patient recovered after a course of bismuth therapy.

Ethmoid Sinus.—Coates [260] reviews the progress of the conception of hyperplastic and suppurative ethmoiditis, simple or complicated by allergy, and comments on the value of a cytologic study of the secretions. He describes the difference between simple edematous polyp which is allergic, mixed polypoid hyperplasia and papillary hypertrophy or mulberry polyp. He believes that avitaminosis is an etiologic factor and recalls Dean's dictum that hypertrophied tonsils and adenoids are frequently the cause of sinusitis in children. Persons with chronic ethmoiditis seek relief (1) because of persistent discharge, bad breath, headache, obstruction, aprosexia, etc., and (2) because they are sent by other physicians who suspect a possible focus of infection as a cause of ocular disturbances, diseases of the gallbladder, neuritis, etc. The author recommends thorough study and repeated examinations, including displacement with contrast mediums and roentgen examination, before surgical measures are employed. In most cases conservative nonsurgical measures will afford relief. If intranasal surgical intervention is required, he suggests preserving the middle turbinate. If extensive disease exists, he recommends the Sewell or the Ferris Smith technic, and he states that care should be taken not to injure the bone, lest the regeneration of the mucosa be delayed. The author quotes Luongo's success in 50 cases in which the constitutional symptoms were cured in 50 per cent and relieved in 30 per cent.

In a series of 45 cases of intracranial complications due to ethmoiditis, Hutchinson [261] determined that in 19 the complications resulted from the spread of infection via the blood stream, in 20 from direct extension of the infection and in 8 from a combination of both, while in the remainder the route was undetermined. The percentage of such complications in all cases of acute infection was 2.5 and in those of chronic

259. Tzetzu, I., and Stefaniu, A.: Syphilis du sinus frontal, Rev. româña de urol. **1**:33, 1934.

260. Coates, G. M.: The Problem of the Ethmoid, Ann. Otol., Rhin. & Laryng. **44**:42 (March) 1935.

261. Hutchinson, C. A.: The Problem of Chronic Fronto-Ethmoiditis, J. Roy. Army M. Corps **64**:235 (April); 307 (May) 1935.

infection, 0.66. In discussing indications for operation in cases of chronic infection, the author lays down the following rules:

When the disease is quiescent and is only accidentally discovered by roentgenograms, nothing should be done. A patient in good health but with slight catarrhal symptoms is best treated symptomatically. In cases in which the symptoms are so severe as to necessitate operation, the author advises Mosher's intranasal operation when the infection is limited to the anterior cells. The anterior end of the turbinate is removed, the cell walls are punched rather than curetted. The author discusses the various approaches, of Coakley, Harmer, Turner and Sewell, that are used in cases in which the infection is mainly limited to the frontal sinus, with obstruction of the duct and involvement of adjacent cells, but he offers no suggestions. He points out the dangers of intranasal approach in cases in which both the anterior and the posterior cells are involved but the frontal sinus is uninvolved and leans to external operation. He favors the Howarth operation in cases in which all cells and the frontal sinus are affected. He attributes the persistence of pain after operation either to loculation with impairment of drainage or to hypersensitive mucosa where deep trigeminal nuclei are affected by toxemia. Failure to obtain cure in cases of fronto-ethmoiditis is due to (1) insufficient removal of pathologic mucosa, (2) incomplete removal of the cells about the floor of the frontal sinus and the roof of the orbit, (3) imperfect drainage, (4) failure to recognize and treat a crista galli cell of the opposite frontal sinus, (5) hemorrhage preventing adequate view of the field, (6) excessive lavage or (7) the presence of syphilis, tuberculosis, a foreign body or a sequestrum. In such cases successful treatment may be given by dry heat, transnasal ionization and further drainage of the ethmoid sinus by the Mosher method.

Bourguet and Haas [262] point out the necessity of differentiating between periostitis of the orbit and true invasion by erosion with few well defined symptoms. Displacement of the bulb opposite to the affected sinus is an important symptom of the latter.

Porta [263] reports a case in which a fistula persisted after an external operation on the frontal sinus owing to infection of an unusually extensive ethmoid system, the cells extending along the roof of the orbit to the sphenoid sinus. Instillation of contrast mediums helped to outline aberrant cells in the fronto-ethmoid region, which communicated with the frontal sinus by erosion. A cure was effected by the Skillern technic.

---

262. Bourguet, F., and Haas, E.: Sinusite fronto-ethmoidale exteriorisée, Bull. Soc. d'opht. de Paris, February 1935, p. 107.

263. Porta, C. F.: Sinusite fronto-etmoidale in soggetto con rare anomalie dell'etmoide, Boll. d. mal. d. orecchio, d. gola, d. naso **53**:408 (Aug.) 1935.

Okonogi [264] saw a 1 year old child who was shot with an air rifle. The wound was in the region of the right side of the nasal root. Roentgenograms showed the bullet in the ethmoid sinus. Rhinoscopy disclosed a bloody area in the upper portion of the middle turbinate. Probing was ineffectual. Three days later the foreign body was expelled in the feces. The author had contemplated an intranasal or a permaxillary approach rather than an external operation.

Pietrantoni [265] frequently finds disease of the ethmoid sinuses in association with infection of the maxillary sinuses and believes that when the antrum is opened intranasally one should at the same time do a thorough exenteration of the ethmoid cells with removal of the uncinate process.

Sphenoid Sinus.—Lyman [266] quotes Frazin and Cushing on the failure of operation on the gasserian ganglion and cervical sympathectomy to bring about relief from atypical trigeminal neuralgia, a term used to describe a variety of pathologic condition which is not true of tic douloureux. Neuralgia emanating from the sphenopalatine ganglion is differentiated from tic douloureux (1) by the history or presence of sinus infection, (2) by the fact that the pain is frequently bilateral, (3) by the tendency of the pain to radiate to the neck and shoulder and (4) by the fact that the pain is more or less continuous and is not inaugurated by stimulation of a trigger zone. In the author's cases if relief followed cocainization of the ganglion, he investigated the posterior sinuses thoroughly and frequently opened and drained them. This procedure was followed by an injection of 5 per cent phenol in 95 per cent alcohol, with relief in 5 cases. One patient had neuralgia of the sphenopalatine ganglion plus a true tic. Relief was obtained from the former by opening the sphenoid sinus, but in order to obtain relief from the latter a posterior root section was necessary.

Cavanaugh [267] presents an interesting paper in which the history of the sphenoid sinus is reviewed from remotest antiquity to the present time. The progress of knowledge concerning this sinus is described, with intelligent and brief comments as to its significance and value. An extensive bibliography adds to the value of the work.

---

264. Okonogi, S.: Ein spontan ausgestossener Fremdkörper der Siebbeinzellen, Otologia (Fukuoka) **8**:807, 1935; abstr., Zentralbl. f. Hals-, Nasen- u. Ohrenh. **25**:632, 1935.

265. Pietrantoni, L.: Le sinusiti croniche etmoido-mascellari: Rilievi anatomici, clinici e chirurgici, Oto-rino-laring. ital. **5**:457, 1935; abstr., Zentralbl. f. Hals-, Nasen- u. Ohrenh. **26**:24, 1936.

266. Lyman, H. W.: The Sphenoid Sinus and the Sphenopalatine Ganglion as Factors in So-Called Atypical Trigeminal Neuralgia, Ann. Otol., Rhin. & Laryng. **44**:653 (Sept.) 1935.

267. Cavanaugh, J. A.: The Sphenoid on Parade, Laryngoscope **45**:911 (Dec.) 1935.

Allergy.—A study of allergy in relationship to sinus disease was made by the late Dr. Mullin [268] on a series of 216 patients who came to the clinic for operation. He found that allergy was present in from 30 to 35 per cent of all cases of chronic infection and states that an eosinophil count of more than 3 per cent was considered at least significant. More important emphasis, however, was laid on an increase of eosinophils in the blood. He found no improvement from the use of calcium or acids by mouth. The best results were obtained by regulating the diet; often all known irritants were removed. Surgical procedures were restricted to resection of the septum, removal of obstructing polypi and simple drainage of a suppurating sinus.

Cohen [269] believes that early failures in testing are due to using too few allergens and not paying enough attention to foods. He finds that the pressure puncture method is the most satisfactory, the reactions being more uniform and more easily tabulated. He uses dry allergens and Ringer's solution, which is less irritating than sodium hydroxide. The production of a wheal is not necessary since hyperemia greater than that seen in the control area is considered positive. Dietary control yielded the author his best results. This method of treatment was used in 23 cases of sinusitis alone or in combination with hay fever, asthma or disturbances of the gastro-intestinal tract, with the following results: entire relief, 49 per cent; much relief, 34 per cent; some relief, 6 per cent, and failure, 11 per cent.

Sewell [270] contends that the common cold is due to pus-forming bacteria activated by a filtrable virus. A natural or acquired immunity may lapse owing to reduced resistance or chilling or other factors permitting the bacteria lying in the diseased mucosa of the sinus to become active. As a result, a virus is produced and discharged into the nasal chambers activating the same type of bacteria which are present in the mucous membrane but have hitherto been dormant or saprophytic. He believes that the virus found in the nasal discharge from such patients can activate the same type of germs in the nose and throat of other persons. This vicious circle can persist until the original sinus reservoir is rendered innocuous. The rôle of allergy as a predisposing factor consists in its effect on the submucosa, the reticular structure of which, becoming distended, offers a favorable bed for the implantation of bacteria, the growth of which is further favored by the comparatively

---

268. Mullin, W. V.: Surgical Indications in Disease of the Nasal Sinuses Due to Allergy, S. Clin. North America **15**:839 (Aug.) 1935.

269. Cohen, A. I.: Allergy and Its Relationship to Sinusitis and Allied Nasal Conditions, Arch. Otolaryng. **21**:265 (March) 1935.

270. Sewell, E. C.: Sinusitis, Allergy and the Common Cold, Arch. Otolaryng. **22**:425 (Oct.) 1935.

impoverished blood supply as compared to the normal. Thickened edematous tissue, whether acute or chronic, must necessarily offer less resistance to bacterial growth and therefore tend to persistence of the organisms, the activity of which is spurred by intercurrent factors, as mentioned previously. However, the author was emphatic in his contention that allergy alone is not sufficient to cause chronic sinusitis. Its action on the mucosa is that of an irritant producing a discharge that is comparatively free from leukocytes, whereas infection possessing more chemotactic influence causes leukocytosis with a thick, colored discharge, denoting more extensive bacterial reaction. In the discussion, R. Nelson emphasized the value of different types of mucosa and pointed out that edematous tissue with its poorer blood supply than normal must be an important factor in the question of resistance to infection.

Kallós [271] examined the nasal discharge in 120 cases, and his findings agree with those published by Hansel in similar cases. In chronic catarrhal processes of the nose and sinuses and also in cases in which polyposis was present Hansel found from 10 to 50 per cent polymorphonuclear eosinophils. The author sought to determine the allergic state by the proteose skin reaction of Bárány and Kallós and by testing for specific allergens. Furthermore, the secretions from the tonsils in cases of articular and muscular rheumatism also showed an increase in the number of eosinophils. Controls failed to show these high percentages. The author found the eosinophils distributed in the proportion described by Hansel. In cases of acute infection entire fields were nothing but eosinophils, and at other times they were seen in clusters of from 10 to 20, bunched among neutrophils and lymphocytes.

Dermatologic Conditions.—Alföldy [272] finds many diseases of the skin due to foci of infection in tonsils, adenoids and sinuses. Such conditions as dyshydrosis, furunculosis, pyoderma, urticaria and pruritus were in a certain number of instances found to be due to latent sinus infection. A group of 300 cases of diseases of the skin was studied, but the percentage of sinus infections was not given. In such cases the usual tests frequently give negative results but changes are observed in the roentgenograms. Usually conservative treatment was sufficient to clean up the focus, with prompt relief of the condition of the skin. The author states that it is his belief that the infection is transmitted from the tonsils and adenoids by way of the lymphatics, but he offers no explanation for the sinus as a focus of infection.

---

271. Kallós, P.: Ueber Vorkommen von Eosinophilzellen im Sekret der Nase, Acta oto-laryng. **22**:106, 1935.

272. Alföldy, J.: Durch rhinolaryngologische, Infektionsherde aufrechterhaltene Hauterkrankungen, Monatschr. f. Ohrenh. **69**:55 (Jan.) 1935; Die Nasen- und Rachenerkrankungen als Ursachen von Dyshydrose und Ekzema, Acta oto-laryng. **22**:76, 1935.

Abstracts from Current Literature

Ear

PURULENT OTITIS MEDIA IN THE NEWBORN. D. J. DOLAN and M. J. H. GRAND, New York State J. Med. **35**:669 (July 1) 1935.

Among 8,000 new-born infants only one was found with purulent otitis media. A new-born colored girl had a seropurulent discharge from both ears on the eighth day of life. The mother had died of streptococcic peritonitis on the seventh day post partum. The first cultures from the ear showed the same organism; later other bacteria were also found. Bronchopneumonia developed, and the child died at 2 months of age. AIKMAN, Rochester, N. Y. [AM. J. DIS. CHILD.]

LOCALIZED NON-SUPPURATIVE ENCEPHALITIS OF OTITIC ORIGIN. J. B. HORGAN, Brit. M. J. **2**:161 (July 27) 1935.

A brief report is submitted of a case which further substantiates the observation by Symonds that localized nonsuppurative encephalitis constitutes a distinct intracranial complication of otitis media. A boy aged 16 who had suffered from suppurative otitis media on the right side since childhood showed signs and symptoms suggesting abscess of the brain. Complete left hemiplegia developed with signs of increasing meningeal irritation. There was no improvement after a radical mastoidectomy. Later the cerebellum and cerebrum were explored, but the brain substance was entirely free from any abscess. The spinal fluid was normal except that it was under moderate pressure. During the ensuing month the patient made a complete recovery. BECK, Buffalo. [ARCH. NEUROL. & PSYCHIAT.]

CHARACTERISTICS AND PROPERTIES OF ELECTRICAL DEAF AIDS. J. MORRIS, J. Laryng. & Otol. **50**:809 (Nov.) 1935.

Morris shows that the types of electrical hearing aids for the deaf may be divided into three classes, viz., individual aids (worn on or about the person), semiportable aids (involving the carrying of a case of some kind) and group aids (in churches, cinema-houses, theaters and so on). The majority of the individual aids are constructed on the same principle and consist of a microphone (single or multiple), telephone receiver (which may be of the aural or the bone conduction type), battery and "on and off" switch coupled by means of flexible wiring and disposed about the person. Some of these aids have a small microphone amplifier, which consists of a telephone receiver and microphone coupled together in a small case and acts as a strengthener, or amplifier, of the received sound; sometimes also there is a small variable resistance coil arranged in series to act as a volume control. Regarding the construction of the microphone, the author states that it consists essentially of a shell containing a carbon block, with a number of shallow depressions to hold the small carbon shot, and a carbon diaphragm, the periphery of which is clamped and the center free to vibrate under the influence of the received sound waves. After discussing the origin of the parasitic noises, the author gives his attention to the telephone receiver or ear-piece and then to the battery. In recent years considerable advance has been made in connection with microphone amplifiers, and these are used to a much greater extent, especially in connection with the electric aids designed for reception by bone conduction. The basis of the majority of these amplifiers is a telephone receiver permanently coupled to a microphone. The sounds picked up by the primary microphone are converted into amplified vibrations in the receiver portion of the amplifier, and the microphone portion is actuated, with the result that the vibrations as originally received are

still further amplified in the ear-piece, or receiver for bone conduction. The microphone portion of the amplifier differs in construction from the primary microphone and does not suffer from the same disadvantages as regards noise and trouble with burning and crackling, but it must be remembered that the background of noise and crackling of the primary microphone are reproduced at a higher noise level. Another point is that the addition of the microphone amplifier means an extra drain on the battery, with consequent greater reduction in the period of its useful life. Receivers for bone conduction have been brought into great prominence during the last few years. Hearing by bone conduction is by no means a new development. As far back as 1757 Dr. Haller demonstrated the possibility of hearing by means of conduction through the bones. When electrical aid first came to be used in this connection is somewhat obscure, but it was not until about 1925 that any real success was accomplished. In 1932 Dr. Lieber introduced his vibrator, or oscillator, which in one form or another forms the basis of the majority of present-day bone conduction receivers. The semiportable aids are becoming increasingly popular. The introduction of miniature thermionic valves has enabled physical dimensions to be greatly reduced—one four valve set, complete with self-contained batteries, is no larger than a no. 2A kodak box camera. With this type of aid a great deal more can be accomplished in the way of faithful reproduction of the received sound, attenuation or accentuation of selected frequency bands and control of the volume of sound. The author mentions some of the disadvantages of these semiportable aids to the deaf and then gives his attention to the group aids. These consist, in general, of powerful valve-amplifying apparatus, with high quality microphones, and represent what may be termed the ideal method of helping the deaf in churches, theaters, cinema-houses and other places of public assembly. Microphones of the moving coil type and of the recently devised ribbon type, although they require a large degree of amplification, can readily be utilized with these large amplifiers. The faithful reproduction and the absence of background noise are a revelation to persons who have not listened to reproduction with these aids. The ear-phones may also be of the moving coil type, although not necessarily, as damped ordinary receivers are almost as good. Ear-phones can have individual volume control and adjustment of pitch, or the attenuation and accentuation of a selected frequency band are readily accomplished. The disadvantages are the initial high cost of these aids and the necessity of expert attention for maintenance if the full utility is to be preserved. The author points out further that a special laboratory and apparatus must be maintained for the calibration of the test microphones, artificial ears and so on. In spite of the large amount of work which has been carried out it is generally agreed that much more investigation is necessary to obtain data concerning the human ear before an artificial ear with more nearly correct characteristics can be devised. Although somewhat outside the intended scope of this paper, audiometry is closely allied. In prescribing the form of aid that will assist a deaf person, the pure tone method leaves something to be desired, and the rectifying property of the ear is left out of consideration. The author shows that some method of testing with actual speech is to be desired. In this connection he mentions the gramophone audiometer, the magnetized wire or tape reproducer and a photo-electric talking-machine. At the end of his report he gives a rather extensive bibliography and a list of patents relating to aids to the deaf.

EDITOR'S ABSTRACT.

MASTOIDITIS IN ASSOCIATION WITH THE INFECTIOUS DISEASES OF INFANTS. A. FULCONI, J. de méd. de Paris **55**:755 (Aug. 29) 1935.

This article consists of a collection of varying opinions as to the etiology, course and significance of mastoiditis in infants. In conclusion one can say only that this condition should always be considered in cases of nutritional disturbance and of prolonged or recurrent otitis media. The operation is one not to be undertaken lightly. Simplification of the technic would be of decided benefit.

LESLIE, Evanston, Ill. [AM. J. DIS. CHILD.]

THE IMPORTANCE OF THE SIGN OF VESTIBULAR DISHARMONY IN A CASE OF ABSCESS OF THE CEREBELLUM. L. LEVESQUE, F. BARRON and A. CHARBONNEL, Rev. d'oto-neuro-opht. **13**:186 (March) 1935.

A 5 year old child convalescing from bilateral mastoidectomy after an attack of scarlatina suddenly experienced fever, occipital headache and hyperextension of the neck. Associated with this syndrome was a disharmonious vestibular syndrome consisting of nystagmus to the diseased side, deviation of the arms, Romberg's sign and lateropulsion in the same direction as the nystagmus; there was slight but distinct cerebellar dysmetria, which of itself was not sufficient evidence on which to base a diagnosis of abscess of the cerebellum. On account of these two syndromes immediate exploration of the cerebellum was made, and an abscess was evacuated. Later the deviation of the arms and the Romberg sign were changed in direction. Death occurred suddenly two months after intervention from an undetermined cause. The association of the disharmonious vestibular syndrome was the deciding factor in the diagnosis.

DENNIS, Colorado Springs, Colo. [ARCH. NEUROL. & PSYCHIAT.]

CONTRIBUTIONS TO THE PATHOLOGIC ANATOMY OF THE EAR: THE ARRANGEMENT OF FUNCTION IN THE NUCLEUS VESTIBULARIS. G. BODECHTEL and H. RICHTER, Arch. f. Ohren-, Nasen- u. Kehlkopfh. **140**:126, 1935.

Bodechtel and Richter report their histologic observations on the temporal bones and on the brain of a man who died of otogenic meningitis. One of the most noteworthy clinical manifestations was the complete lack of responsiveness of the apparatus of equilibrium on each side to caloric and rotation stimuli. The authors hoped that their histologic studies would throw light on this phenomenon. They found on the left side acute purulent otitis media with perforation of the vestibular and cochlear fenestrae, acute diffuse purulent labyrinthitis, progressive suppuration in the internal auditory meatus and purulent neuritis of the acoustic nerve. The examination of the right temporal bone revealed no pathologic changes. For this reason it was at first inexplainable why the apparatus of equilibrium on the right side had been unresponsive to stimuli. However, the brain stem disclosed the anatomic foundations of this clinical peculiarity. The brain showed the changes that are typical for a suppurating pneumococcic meningitis, but, in connection with the clinical unresponsiveness of both labyrinths, it is especially noteworthy that the cells in the lower external corner of the nucleus triangularis vestibularis showed a peculiar impairment. The authors admit that the origin of these cellular changes is not easily discerned; they assume that toxic influences reached the cells by way of the nerve fibers. Transmission by way of the ventricle, the fluid of which doubtlessly contained toxic materials, seems less likely. They emphasize that the changes in the nucleus triangularis vestibularis are of especial importance for the localization of the elicitation of nystagmus. They say that, although it was known that nystagmus had some connection with the rather extensive region of the nucleus triangularis, Bechterew's nucleus and Deiters' nucleus, it was unknown what partial function was controlled by the different areas of cells. The fact that Deiters' nucleus, Bechterew's nucleus and even the small cells of the triangular nucleus were unimpaired in the reported case indicates that only the medium-sized cells in the lower external corner of the nucleus triangularis play an important part in the elicitation of nystagmus.

EDITOR'S ABSTRACT.

HISTOPATHOLOGY OF SCARLATINAL MASTOIDITIS. M. A. POSNJAK and P. J. GEHRKE, Monatschr. f. Ohrenh. **69**:1062, 1935.

Posnjak and Gehrke emphasize that not only the type and course of scarlatina itself differ but also its otic complications. They think that this difference is chiefly due to a reduction in the reactive capacity of the organism. In accordance with this, they differentiate between a toxoreactive and a toxo-anergic form. In the first instance the otitis differs only slightly from the ordinary form, whereas

in the second the depth, extension, rapidity and particularly the character of the usually necrotizing process are as a rule surprising. Thus it seems likely that the otitis that accompanies the milder forms of scarlet fever differs in the histologic aspects from the otitis that accompanies the septic forms. The authors studied nineteen cases of scarlatinal mastoiditis, in six of which the scarlet fever took a mild course and in thirteen a severe course. Of the latter, one case was of toxic, the other twelve of septic, character. In studying the histologic aspects of the mastoiditis that accompanies the milder forms of scarlet fever, the authors were surprised by the intensity of the involvement of the bone and of the cellular contents. In all of the examined patients they noted early destruction of the epithelial elements and of the mucous membrane. In the bone, there were no signs of apposition, only signs of intense resorption. In septic mastoiditis the necrotic processes predominated. They involved not only the cell structure but also the bone substance of the mastoid process. Only in the cases in which the infection was perhaps slightly less virulent did there develop beside the necrotic processes also signs of reactive inflammation. The authors think that in the necrotic forms of mastoiditis the entire pneumatic system should be removed in the course of the operation.

EDITOR'S ABSTRACT.

Pharynx

PHARYNGEAL PALPATION IN ADENOID INFECTION. LOUIS LEROUX, Bull. Soc. de pédiat. de Paris **32**:628 (Dec.) 1934.

A child 18 months old had infected adenoids and repeated abscesses of the middle ear. During a flare-up of the nasal infection the adenoid tissue was crushed by pressure with the finger introduced into the nasopharynx. The fever continued for a number of days. The ears continued to discharge mucopus, but the nasal discharge ceased. A short time later the mass of adenoids was removed, and the infection of the ear subsided, the drums assuming their normal appearance in a week. Crushing of the adenoid with the finger in cases in which adenoid infection with fever persists for several weeks and otitis media has developed may be followed by improvement because, it is conjectured, abscesses within the adenoid, too small to be recognized by palpation, are thus ruptured and drained.

BENJAMIN, Montreal, Canada. [AM. J. DIS. CHILD.]

ADENOIDS: A FREQUENT CAUSE OF THE ADIPOSOGENITAL SYNDROME. CITELLI, J. de méd. de Paris **55**:894 (Oct. 10) 1935.

Citelli states that twelve patients with Fröhlich's syndrome observed in the last year either had large adenoid vegetations or had had adenoids removed. Those who were followed improved after removal of the adenoids and administration of extract of the anterior lobe of the pituitary. His conclusion that adenoid tissue affects adversely the anterior pituitary secretions does not seem to be warranted.

LESLIE, Evanston, Ill. [AM. J. DIS. CHILD.]

LEUKOPENIA IN PHARYNGOGENIC (TONSILLOGENIC) SEPSIS. R. WALDAPFEL, Monatschr. f. Ohrenh. **69**:1178 (Oct.) 1935.

Waldapfel uses the more inclusive term pharyngogenic sepsis instead of the more frequently used tonsillogenic sepsis, because he regards the tonsils as a portion of the pharyngeal mucous membrane. A septic focus may exist at any site in the pharynx, but it is, of course, most frequent in the tonsils. If an infectious process originates in the pharynx and produces general symptoms in the organism, two extreme effects may appear in the blood apparatus: (1) the usual leukocytosis, with deviation of the cellular types to the left (outflow of immature elements), and (2) in rarer instances paralysis of the leukopoietic system, involving either the maturation process of the cells or the mechanism of the outflow of the cells.

In this report the author concerns himself with neither of these effects but with a condition that stands between the two, namely, granulocytopenia or the absence of leukocytosis. He reviews the reports of several cases from the literature and describes several cases which he observed. Common to all these cases was leukopenia or the absence of leukocytosis, usually in the presence of deviation of cell types to the left. Moreover, in all cases the condition had a lethal outcome. The author concludes that, although not every case of pharyngogenic sepsis in which the termination is fatal is accompanied by leukopenia, it can, nevertheless, be stated that in the cases in which the leukocytic reaction is absent the disease usually has a fatal outcome and that deviation to the left without leukocytosis indicates a much less favorable prognosis than does deviation to the left with leukocytosis, for the deviation to the left in the presence of a low leukocyte count indicates that the reserves of the organism are mobilized but that no further defense action may be expected. On the other hand, an organism with power of resistance responds to severe infection not only with deviation to the left but, as a sign of normal defense, with a large number of leukocytes. EDITOR'S ABSTRACT.

AN UNUSUAL DISEASE SEEN IN CONSULTATION. K. OXENIUS, München. med. Wchnschr. **82**:1240 (Aug. 2) 1935.

Oxenius reports two cases of fever due supposedly to an obscure cause: A boy 1½ years old had a temperature ranging from the normal level to 104 F. for two weeks. Every diagnostic test of which the family physician could think had been performed, but all gave negative results. The child was well nourished and not acutely ill, and the only positive findings on examination were enlargement of the posterior cervical lymph nodes, injection of the uvula and fauces and a retropharyngeal drip of thick purulent mucus. A suitable prognosis was given, and after symptomatic treatment the temperature gradually declined to normal.

A girl 2½ years old had a similar fever of longer duration. The author stresses the fact that such conditions are not demonstrated to the medical student, and since such patients are not hospitalized the intern does not see them. It is important to be able to differentiate benign infection of prolonged duration and the onset of a serious condition.

BRAHDY, Mount Vernon, N. Y. [AM. J. DIS. CHILD.]

PATHOGENESIS OF POSTANGINAL SEPSIS. S. NOZAWA, Ztschr. f. Laryng., Rhin., Otol. (Teil 1: Folia oto-laryng.) **26**:273, 1935.

Nozawa points out that there is still disagreement regarding the pathogenesis of postanginal sepsis. Some investigators maintain that phlebitis or thrombophlebitis in the region of the tonsillar veins is the focus of the septic process, whereas others are of the opinion that usually the process spreads first from the tonsils to the regional glands by way of the lymph channels and only secondarily by way of an infected thrombus that has developed beside a suppurating lymph node in the internal jugular vein. Those adhering to this second theory of pathogenesis consider primary thrombophlebitis of the tonsillar veins to be the exception. The author stresses that the clarification of the pathogenesis determines the therapeutic intervention, namely, the removal of the focus of infection. In order to gain a better insight into this problem he made experimental studies on young dogs. The animals were given intratonsillar injections of hemolytic streptococci or yellow staphylococci. Nearly all the animals died with signs of sepsis. They were subjected to careful examination, particularly of the oral, pharyngeal and cervical organs. Of the forty-five animals twenty-nine were selected in which pathologic changes were detected in the veins of the oropharyngeal or the cervical region. In all these cases there existed phlebitic or thrombophlebitic changes in the tonsillar root veins, but in fourteen cases the internal jugular vein was intact, whereas it was involved in the other fifteen cases. In eight of the fifteen cases just mentioned in which infection had been induced with streptococci the author demonstrated intravascular spread from the tonsillar root

veins to the jugular vein. However, in the seven cases of this last group in which staphylococcic infection had been induced not only the internal jugular vein but the surrounding interstitial tissues and the adjoining lymph nodes showed severe destructive changes, so that it was impossible to determine definitely in what manner the jugular changes had developed. However, since in these seven cases the tonsillar root veins always showed pathologic changes, since these changes could be considered to be of primary periphlebitic nature and since, moreover, retrogressive spread of the process in the jugular vein could be excluded, it was assumed that in these cases the inflammation of the tonsillar root veins spread likewise by the intravascular path. The author reaches the conclusion that the phlebitis or thrombophlebitis of the tonsillar root veins is usually the primary process in cases of postanginal sepsis and that if the internal jugular vein becomes involved it does so usually by intravascular spread from the tonsillar root veins.

EDITOR'S ABSTRACT.

Nose

CHRONIC SINUSITIS IN CHILDREN. FERRIS SMITH, J. Michigan M. Soc. **34**:593 (Oct.) 1935.

Smith is of the opinion that no one has as yet offered a sound explanation for some of the pathologic phenomena noted in the upper air passages of children and adults. He classifies the etiologic factors of sinusitis as constitutional and local and quotes Dean as saying, "If it were not for the allergic states, nutritional disorders, and endocrine disturbances, we would not have many cases of sinus disease." He believes that "the practiced treatment consisting of sprays, 'drops' and packs becomes nonsense" and that one must discover the underlying cause of the condition if treatment is to be effective.

CAREY, Detroit. [AM. J. DIS. CHILD.]

EOSINOPHILIA OF THE NASAL MUCOSA AND OF NASAL POLYPI AS AN INDICATOR OF ALLERGIC DISEASE. V. HLAVÁČEK, Monatschr. f. Ohrenh. **69**:1153 (Oct.) 1935.

Hlaváček shows that eosinophilia of the tissues is a constant sign of allergic disease. He detected a mild degree of eosinophilia in hay fever, a more severe form in vasomotor rhinitis and the most severe eosinophilia in the polypi of patients with asthma. He states that if eosinophilia is observed in the polypi other signs of allergic disease should be searched for. He reports further how he effected an increase in the number of eosinophils in the nasal mucosa of guinea-pigs. As a sensitizing substance scales from horses were used. It was found that in the sensitized animals, in which shock was elicited by the parenteral injection of the antigen, the number of eosinophilic leukocytes was slightly increased in the nasal mucosa. However, when shock was produced in sensitized animals by the direct action of the antigen on the mucous membrane of the upper respiratory passages considerable eosinophilia of the nasal mucosa was the result. The increase in the number of eosinophils in the tissues follows the same laws as the increase in the blood; it reaches a peak several hours after anaphylactic shock.

EDITOR'S ABSTRACT.

INTRACAVERNOUS INJECTIONS IN THE THERAPY OF ATONY OF THE CAVERNOUS TISSUE OF THE INFERIOR TURBINATE BODY. E. POLLAK, Monatschr. f. Ohrenh. **69**:1161 (Oct.) 1935.

Pollak shows that swelling of the nasal mucous membrane, particularly in the region of the lower nasal concha, is one of the chief factors in the inhibition of nasal breathing. The capacity of the cavernous spaces to change, especially to increase, the degree of filling plays the most important part in this condition.

Under the influence of certain pathologic factors the concha is incapable of proper adaptation to respiratory, thermic, chemical, dynamic and reflex stimuli and remains excessively distended, thereby inhibiting proper breathing. In these cases the muscle fibers of the cavernous tissue have lost their proper tonus and have become dystonic or atonic. The author mentions the various therapeutic measures that have been tried for this condition of dystony or atony and then describes his own method of treatment. After removal of the secretion he anesthetizes the lower nasal concha by means of gauze that has been saturated with fluid consisting of equal parts of a 10 per cent solution of cocaine and a 1 : 1,000 solution of epinephrine hydrochloride. If after ten minutes the proper degree of retraction has not been achieved, epinephrinization must be continued until this condition is reached, and then a sterile 20 per cent solution of sodium chloride is injected, to which a 0.5 per cent solution of para-aminobenzoyl-di-ethylamino-ethanol hydrochloride has been added (for analgesic purposes). The author asserts that this injection, if properly made, leaves the superficial layers of the mucous membrane unimpaired but that, by the obliteration of connective tissue within the cavernous tissue, it reduces the volume of the lower nasal turbinate body and thus facilitates nasal breathing to the extent to which it was impaired by the swelling of the turbinate body.

EDITOR'S ABSTRACT.

RELATION BETWEEN DISEASES OF THE NASAL REGION AND VIRUS DISEASES OF THE CENTRAL NERVOUS SYSTEM. SCHWARZE, Ztschr. f. Laryng., Rhin., Otol. (Teil 1: Folia oto-laryng.) **26**:305, 1935.

Schwarze includes in the disorders of the nasal region all diseases of the nose, the accessory sinuses, the sphenoid bone, the frontal bone and the nasopharynx. He points out that epidemic poliomyelitis is frequently preceded by disorders in the nasal region and that this was known even before the disease was transmitted to monkeys by means of vaccination with influenzal nasal mucus. On the basis of this bacterial transmission attention has been called repeatedly to the development of diseases of the central nervous system after influenzal disorders. After mentioning some of the authors who have discussed this problem, the author returns to the discussion of the connection between poliomyelitis and the influenzal infections, pointing out that children below the age of 6 years show a special predisposition. He thinks that the incomplete development of the internal portion of the nose in young children is an important factor. Further, he points out that angina and coryza are among the first symptoms of poliomyelitis. It has been found that coryza in association with this disease develops first in the nasopharynx and then enters the nose. The author thinks that at times in which poliomyelitis occurs with greater frequency it is advisable to institute local treatment with a disinfecting agent in patients with coryza and pharyngeal catarrh. He recommends spraying with a concentrated solution of quinine and antipyrine and swabbing of the pharynx. Further, he gives his attention to optic neuritis, which is often connected with disorders of the frontal and of the ethmoid bone and frequently occurs in cases of multiple sclerosis, an extremely grave disease of the central nervous system which is caused by a neurotropic virus. He emphasizes that, in view of the fact that in the majority of cases optic neuritis is connected with multiple sclerosis, patients with optic neuritis should be kept under careful observation and all accessory sinuses, particularly the ethmoid cells, the sphenoid bone and the frontal sinus should be surgically inspected. He thinks that thus the virus infection may eventually be arrested. In the last part of this report he discusses the forms of encephalitis and postencephalitic parkinsonism and again stresses the importance of influenzal infection of the nasal region. He advises search for nasal disturbance in all cases of parkinsonism and stresses the beneficial effects of swabbing the atrophic mucous membranes with a solution of atropine and an alkaloid preparation of ergot. In cases of severe change it may be necessary to resort to surgical intervention, which may have to extend to the sphenoid bone and the posterior ethmoid cells.

EDITOR'S ABSTRACT.

Miscellaneous

HISTOLOGIC ASPECTS OF CRANIAL EXOSTOSES. K. PELZER, Arch. f. Ohren-, Nasen- u. Kehlkopfh. **140**:63, 1935.

Pelzer shows that between exostoses and osteomas there are gradual transitions which make it difficult to differentiate the two conditions. The osteomas are usually considered as true neoplasms, whereas the exostoses are generally classified with the inflammatory processes. In exostoses a certain hereditary tendency has been observed, but they have also been ascribed to mechanical irritations, and in such cases predisposition probably plays a part. That the nomenclature is not used in an entirely logical manner is proved by the fact that a freely movable exostosis from which the thin pedicle has become absorbed and which is thus separated from the osseous substrate is designated as an osteoma in spite of the fact that its origin is that of an exostosis. Others again designate the exostoses a "periosteal osteomas." In giving his attention to the exostoses Pelzer points out that most of them come under clinical observation only after they have reached an advanced stage, and thus it is difficult to obtain histologic pictures of the incipient stages. The exostoses studied by him were chiefly solitary. The first patient had a large exostosis on the posterior wall of the auditory meatus. Its origin could not be determined. The second patient had a flat exostosis on the frontal bone, and the third one, a spherical exostosis on the mastoid process. In summarizing the histologic studies he says that the first patient's exostosis, which was immature, showed in addition to the lamellar and braidlike bone tissues a fine-fibered lamellar tissue that had a strandlike arrangement. In the mature exostoses this type of strandlike bone seems to be rare; by a transformation it seems to have been replaced by lamellar bone. In comparing his observations with those in the literature, he detects a certain conformity. There are compact as well as spongiose exostoses, and some with fat and some with fibrous marrow. The structure is generally lamellar, but in the exostoses which he observed braidlike portions could always be detected in the bone. In addition to this, he also observed fine-fibered bone tissue that was closely related in type to the strand bone of Max Meyer. Greifenstein detected this type of bone in an osteoma. A survey of all of the observed exostoses discloses that their structure is largely dependent on their age.

EDITOR'S ABSTRACT.

OPEN SAFETY-PINS IN THE ESOPHAGUS AND INSTRUMENTS FOR REMOVAL. WÜST, Ztschr. f. Laryng., Rhin., Otol. (Teil 1: Folia oto-laryng.) **26**:322, 1935.

Wüst reports the history of a patient who complained of pains in the region of the stomach and thought that he had swallowed a fish bone. Roentgenoscopy disclosed an open safety-pin in the esophagus. The lock of the safety-pin was broken off, and the broken branch of the pin was lodged in the wall of the esophagus. The attempt to press the branches of the pin together failed. Finally, the broken side of the pin was grasped with a spoon forceps, and the object was extracted. After reporting the patient's further history, the author states that the difficulties that were encountered in the extraction of the pin induced him to construct a tube for the removal of an open safety-pin. However, after its completion he found that an instrument of similar construction and application had been devised more than ten years ago by Mosher. He also points out that devices for closing an open safety-pin prior to its extraction have been constructed by Jackson, Arrowsmith, Schlemmer, von Eicken and Wagener, and he cites the literature on this problem.

EDITOR'S ABSTRACT.

Society Transactions

GERMAN OTOLARYNGOLOGICAL SOCIETY

Bad Reichenhall, June 6 to 8, 1935

ZEITSCHRIFT FÜR HALS- NASEN- UND OHRENHEILKUNDE **38**:53-292 (Oct. 22) 1935.

OTOGENIC SEPSIS. DR. MARX, Wurzburg.

Marx presents a paper on otogenic sepsis. He shows a number of photomicrographs on the pathologic anatomy of sinus and bulbar thrombosis, of the so-called osteophlebitic pyemia and of the wall of the thrombotic jugular vein.

LEADING POINTS OF VIEW IN THE TREATMENT OF OTOGENIC SEPSIS AND SINUS THROMBOSIS. DR. L. HAYMANN, Munich.

Haymann maintains that otogenic general sepsis originates frequently but not always in thrombosis of one of the cerebral sinuses adjoining the temporal bone. He stresses that there are a number of cases in which the clinical aspects of general sepsis are present although the septic focus is not a sinus thrombosis. For this reason intervention on the sinuses should be made only after all available diagnostic aids have been used. Such intervention as ligation of the jugular vein or of the sinus should as a rule not be made before the mastoid has been opened and exploratory measures have been taken, for it is not always possible to diagnose the sinus thrombosis from the clinical manifestations alone. If sinus thrombosis exists, it should of course be excluded by surgical intervention as soon as possible. It is desirable to do this in one session, but it should be realized that this is not possible in all cases.

OTOGENIC SEPTICEMIA WITH ESPECIAL CONSIDERATION OF THE BLOOD PICTURE AND LUMBAR PUNCTURE. DR. SEIFERTH, Cologne.

Seiferth classifies otogenic septicemia into forms with septic, pyemic, septicopyemic and afebrile course. He shows that the cytologic aspects of the blood picture are of diagnostic as well as of prognostic significance. The changes in the red blood cell picture (septic anemia) deserve attention. Leukocytosis, considerable deviation to the left and changes in the red blood cell picture indicate a septic process and make intervention advisable. If the deviation to the left and the neutrophilia have a tendency to subside after operation and if eosinophilia and the signs of a lymphocytic phase of the defense appear, the prognosis is favorable and an expectant attitude is justified. Disturbances in the postoperative course in the presence of an impaired blood picture indicate the necessity of revision of the wound or of further intervention. Lumbar puncture has diagnostic significance in cases in which septicemia is not certain and in cases in which there are obscure cerebral symptoms. Queckenstedt's test is evaluated, and the technic of the operation on the involved sinus is described.

PATHOGENESIS OF OTOGENIC SEPSIS WITH CLINICAL DEDUCTIONS. DR. W. UFFENORDE, Marburg.

Uffenorde emphasizes that the one-sided interpretation of sinus thrombosis as a manifestation of otogenic sepsis does not tally with the facts, pointing out that there may be extensive thrombus formation in otic suppuration without septic manifestations and that, on the other hand, there may be severe sepsis without thrombophlebitis. In summarizing his discussion he points out that bacteremia may

develop in the presence of any focus of inflammation and that fever may be present or absent. As a rule there are no general symptoms, for the organisms entering the blood only occasionally are readily destroyed by it. Sepsis is always accompanied by bacteremia and causes severe manifestations as the result of massive and continuous bacterial invasion. Sepsis may appear with or without metastases. Depending on the mode of dissemination from the septic focus, three types of sepsis are differentiated: (1) the hematogenic type, with direct invasion of the blood stream and without demonstrable involvement of sinuses and vessels, (2) the type with thrombophlebitic involvement and (3) the type that spreads from the ear by way of the lymph channels, infects the glands along the jugular vein and causes obstruction and subsequently thrombophlebitis of the vein.

THE ARTIFICIAL FORMATION OF OBSTRUCTING THROMBOSIS FOR THE RAPID ARREST OF THE BACTERIAL AGENTS CAUSING SEPSIS. DR. HERRMANN, Erfurt.

Herrmann regards the formation of a thrombus as a defense mechanism of the organism against an invading infection. He reasons that if an obstructing thrombus could be produced from the transverse sinus to the internal jugular vein, the invading bacteria would be retained. He decided to investigate this problem experimentally. At first it seemed difficult to find a suitable substance for the formation of such a thrombus. In view of the blood-coagulating properties of mother's milk, it was decided to use a preparation made from it. The author describes the technic of the formation of an artificial thrombus and says that he employed it in 2 cases of otogenic sepsis. He concedes that the recovery of the 2 patients might be accidental, since 4 others, in whom an obstructing thrombosis existed and in whom, therefore, the formation of an artificial thrombus was not employed, recovered also. He makes suggestions for further studies on this problem.

THE DANGERS OF THE SURGICAL EXPOSURE OF THE HEALTHY SIGMOID SINUS. DR. KRIEGSMANN, Rostock.

Kriegsmann concedes that in the majority of antrotomies and radical operations the sigmoid sinus may be exposed, but he emphasizes that there are some cases in which it is not advisable. He observed several cases in which thrombosis developed after the exposure of a normal sinus. In searching for the causes of the secondary thrombosis of the exposed sinus, he points out that the exposure as such cannot be the cause, in view of the numerous cases in which the exposure is not followed by secondary thrombosis. It is known that a lesion on the sinus tube favors the development of a thrombus, and the author observed a case in which, in the course of an antrotomy the emissarium mastoideum was injured and the injury of the vessel doubtless favored the thrombosis. Nevertheless, this cannot have been the only cause for the secondary thrombosis, because there were a number of cases in which there were similar injuries and yet there was no subsequent thrombosis. The common factors in all the cases of secondary thrombosis were a severe inflammation and great virulence of the micro-organisms. In this connection the author points out that the virulence of a micro-organism is usually higher in the beginning and decreases in the course of the disorder, particularly after the third week. He observed that in 4 of the 5 cases in which secondary thrombosis developed the operation had been made early and, that, in addition to this, some of the patients were extremely weak. He recommends that as far as possible antrotomy should be postponed until after the third week following the onset of the otitis. To be sure, there are exceptions to this rule. Moreover, the operative exposure of the sinus should be avoided if possible because secondary thrombosis is much less likely in a sinus that has not been exposed than in an exposed sinus. In chronic otitis the operation should not be made during an acute exacerbation. If in the course of a radical operation the healthy sinus is exposed, the retro-auricular wound should be left open.

A New Technic of Ligation of the Innominate Vein in Patients with Descending Jugular Thrombosis. Dr. Zöllner, Jena.

Zöllner opens the capsule of the sternoclavicular joint as far as it can be approached from the front. Then he passes the wire of Gigli's saw posteriorly around the clavicle, so that it comes close (about 1.5 cm.) to the articular space. If the wire is placed close to the joint, the cut strikes the joint in the center, and thus a sufficient portion of the articular surface is retained. After cutting, the clavicle can be extracted from the joint, and only the small posterior portion of the articular termination remains. This portion can be readily luxated anteriorly, and the posterior articular ligaments can be severed without danger to the vessels below. Then the innominate vein can be detached from the pleura, and the deep ligation is readily accomplished. After this intervention, the clavicle is replaced, and by suturing the anterior articular ligaments it is fixed in its old position.

The Petrosquamosal Sinus. Dr. E. von Oettingen, Wurzburg.

Von Oettingen points out that studies on macerated craniums, vascular controls in necropsies and roentgenograms on living persons indicate that vascular connection from the knee of the sinus to the middle cranial fossa or to the soft parts of the external temporal region is not at all rare, even though a complete sinus petrosquamosus is only occasionally observed. In the region of the petrosquamosal suture vessels are comparatively frequent, and the author calls attention to these. A case in which the injury of a large petrosquamosal sinus caused a severe hemorrhage in the course of an operation proved to him that the detection of vessels above the roof of the antrum is extremely important for the surgeon. He points out that in vivo such vessels can be detected only by roentgenography, and he discusses the technic and the direction of exposure which should be employed in order to find them.

The Venous Anastomoses of Trolard and Labbé. Dr. Tonndorf, Dresden.

Tonndorf directs attention to an error in terminology, pointing out that the vein which in the literature is designated (erroneously) as Trolard's vein, namely, the one passing from the transverse sinus or from the upper knee of the sinus, over the temporal lobe to the median cerebral vein, is really the anastomosis of Labbé (1879). The venous anastomosis described by Trolard in 1868 is a connection between the sinuses at the base of the brain (cavernous or petrosus superior) and the superior sagittal sinus. The real vein of Trolard passes over the sylvian fossa and the central sulcus upward to the vertex. Its basal portion in the sylvian fossa is the vessel that is designated as the vena cerebri media. The author illustrates the anatomic aspects of the anastomoses of Trolard and Labbé on a diagram.

Pneumatization Following Antrotomy. Dr. H. Barth, Berlin.

Barth reports results of later examinations of children who had undergone antrotomy. In children with bilateral otitis media in whom only one side was operated on, pneumatization was generally good or ideal on the side on which operation was not performed, whereas it was somewhat inhibited on the side of operation. On the whole, Barth gained the impression that frequent attacks of otitis media during early childhood inhibit pneumatization more than a single attack. He concedes that probably both factors, inflammation as well as operation, inhibit pneumatization, but he thinks that the effect of the latter is probably the greater.

Otitis and Encephalitis Following Influenza. Dr. H. Claus, Berlin.

Claus reviews the literature and then reports a case in which acute otitis media was preceded by influenza and followed by encephalitis. He expresses the belief that the otitis as well as the encephalitis was caused by the influenza.

CHLORINE GAS IN THERAPY OF CHRONIC OTITIS. DR. F. MOSSBÖCK, Graz.

On the basis of his observations, Mossböck concludes that the treatment with chlorine gas often produces favorable therapeutic results in cases in which other conservative measures fail.

THE FREQUENCY AND SIGNIFICANCE OF THE OTOGENIC DISEASES OF THE PYRAMIDAL APEX. TOBECK, Göttingen.

Tobeck shows that otogenic inflammatory disease of the pyramid of the petrosal apex is more frequent than is generally assumed. Nearly 50 per cent of fatal otogenic conditions show severe inflammatory changes of the pyramidal apex. He classifies the otogenic inflammatory diseases of the petrosal pyramid into suppuration of the pyramidal cells and osteomyelitis of the pyramid. Suppuration of the pyramidal cells occurs almost exclusively in acute suppuration of the middle ear, whereas osteomyelitis of the pyramid occurs in acute as well as in chronic suppuration of the middle ear. The significance of the suppuration of the pyramidal cells and of osteomyelitis of the pyramid lies chiefly in the impairment of the soft meninges by deep epidural abscesses or by direct perforation of the dura, in the development of thromboses in the venous sinuses adjoining the petrosa and in perforations of suppurations into the carotid canal and into the labyrinth. All diagnostic aids should be used in order to detect the inflammatory pyramidal disorder before Gradenigo's syndrome develops, so that an operation can be performed before irreparable changes ensue.

THE THERAPY OF MENINGITIS. DR. H. G. RIECKE, Kiel.

Riecke reports experiences with endolumbar chemotherapy.

THE TREATMENT OF ABSCESS OF THE BRAIN. DR. O. MAYER, Vienna.

Mayer says that an encapsulated cerebral abscess heals after evacuation and drainage. In an encephalitic process, however, this treatment is inadequate. He shows on roentgenograms that neither strips of gauze nor drainage tubes can prevent the development and further growth of an abscess of the brain. The tight tamponade of the entire abscess cavity with iodoform gauze with the tampon left in place for a long period (up to three weeks) has a more favorable effect, because this causes the development of a capsule. Mayer employed this treatment in seven cases, and there was no fatality.

THE HISTOLOGIC EXAMINATION OF THE MEMBRANOUS LABYRINTH OF MAN. DR. A. REJTÖ, Budapest.

Rejtö describes a method for the examination of the membranous labyrinth in fresh specimens, pointing out that the customary methods cause too many changes. Instead of removing the bony capsule by a chemical process of decalcification, he opens the capsule by means of a fine chisel and then extracts the membranous portion by means of a needle. He presents pictures of specimens that were prepared by his method.

RHINOGENIC OSTEOMYELITIS OF THE CRANIUM. DR. VON EICKEN, Berlin.

Von Eicken shows that there are two forms of rhinogenic osteomyelitis of the cranium, chronic and acute. The chronic form is characterized by the repeated appearance of abscesses in the galea after suppuration of the frontal sinus. The abscesses are not necessarily painful, and when they are incised a sequestered piece of bone may be found. One or several cerebral abscesses may develop, and the outcome is usually fatal. Further, he describes several cases of acute osteomyelitis in which he performed operations. One case he considers especially noteworthy because he detected a diploic vein the course of which could be followed from the

tuber frontale into the processus zygomaticus. This observation induced the author to give his attention to the veins of the diploe. He gained the impression that the course of these vessels is more regular than is generally assumed.

THE DEVELOPMENT OF EXTRADURAL ABSCESS IN FRONTAL SINUSITIS. DR. STEURER, Rostock.

Steurer describes a case of extradural abscess with unusual development. The interesting aspect was that the severe comatose condition was produced only by the pressure of the large extradural abscess on the frontal lobe of the brain.

RESECTION OF THE BASE OF THE TONGUE. DR. G. HOFER, Graz.

Hofer shows that subhyoid pharyngotomy in its typical form does not provide a sufficiently clear survey in case of extensive resections on the tongue, but that a greater dislocation of the hyoid bone will facilitate this. He describes the technic of a modified subhyoid pharyngotomy.

THE PROGNOSIS OF TUBERCULOSIS OF THE LARYNX. DR. BRÜGGEMANN, Giessen.

Brüggemann gives a summary report of the fate of 157 patients with laryngeal tuberculosis who received treatment at his clinic.

MORPHOLOGIC CHANGES IN THE PALATINE AND PHARYNGEAL TONSILS OF MAN FOLLOWING THE ORAL PHASE OF DIGESTION. DR. G. EIGLER, Halle.

Eigler found that normal palatine and pharyngeal tonsils eliminate a considerable number of lymphocytes and leukocytes shortly after eating. Since these cells are found in large numbers (partly in the form of casts) in the lacunae, it may be assumed that the wandering cells are given off into the oral cavity in large numbers during the process of oral digestion. Eigler discusses the importance and function of these cells and suggests that they probably play a part in the formation of ferments.

THE CLINICAL AND HISTOLOGIC ASPECTS OF THE ROENTGEN-RADIUM THERAPY OF LARYNGOPHARYNGEAL CARCINOMA. DR. K. AMERSBACH and DR. KRAUS, Prague.

Although Amersbach and Kraus acknowledge the efficacy of Coutard's method of irradiation, they think that Hohlfelder's method is a better one. Preliminary tracheotomy should be avoided as much as possible, and the irradiation should be given in such a manner that reaction, which necessitates tracheotomy, is avoided.

THREE HELPFUL MANEUVERS. DR. LIESCHKE, Plauen.

Lieschke discusses three helpful maneuvers. The first concerns the treatment of acute suppuration of the maxillary sinus. In order to do away with repeated irrigation, he blows the sinus dry after the first irrigation and fills it with from 2 to 5 cc. of a 10 per cent solution of iodoform in glycerin. This injection is repeated at intervals of eight days, and together with ray baths of the head, two or three injections usually result in cure.

In tonsillar abscess, he follows the opening of the abscess by the introduction of a strong conchotome and pinches off a piece of the tonsil, or, if the abscess lies quite deep, he may grasp the entire tonsil. With this treatment the abscesses disappear in about half the usual time, and there is almost never a relapse.

In tonsillectomy, he reduces postoperative hemorrhage by performing the enucleation with the scalpel and the large curet rather than by grasping the tonsils with the dressing forceps. This avoids the cutting of the vessels too deep down and in the oblique direction and thus eliminates the necessity of sutures as well as the possibility of severe hemorrhage.

THERAPY OF BRONCHIAL ASTHMA. DR. KÜHNE, Bad Reichenhall.

Kühne mentions bacterial allergy and points out that the anamnesis of a large percentage of patients with asthma disclosed infectious processes in the region of the respiratory tract. He stresses the necessity of counteracting infections of the accessory sinuses. Moreover, in all cases in which an infectious origin of the asthma is certain, he recommends treatment with autovaccines. Further he discusses the allergens that enter through the respiratory tract (including the climatic allergens) and those entering through the alimentary tract and makes suggestions regarding the treatment by desensitization, by symptomatic medicinal measures and by psychotherapy.

VESTIBULAR HYPEREXCITABILITY IN PATIENTS WITH LESIONS OF THE EXTRAPYRAMIDAL SYSTEM. DR. UNTERBERGER, Jena.

Unterberger maintains that in patients with a cerebral tumor or some other disorder of the central nervous system the appearance of an increase in the labyrinthine reflexes and of reactions (otherwise characteristic only for animals) such as nystagmoclonus and postural reflexes, is a manifestation of a loss of proper control. These disturbances are produced by the interruption of central controls (probably originating in the extrapyramidal system), which are superimposed over the true vestibular centers in the caudal brain stem. They are not manifestations of hyperexcitability.

THE QUESTION OF SUBSTITUTING THE OTO-AUDION FOR THE CONTINUOUS TONE SERIES IN FUNCTIONAL EXAMINATIONS OF THE EAR. DR. W. SCHWARZ, St. Blasien.

Schwarz shows that tests of hearing with audiometers give more information about the auditory function in persons with pathologic conditions of the ear than do the tests with the continuous tone series.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY

Regular Monthly Meeting, April 6, 1936

T. C. GALLOWAY, M.D., *President*

WALTER H. THEOBALD, M.D., *Secretary*

PATHOLOGIC GROUP SYMPOSIUM

GROUP STUDY IN OTOLARYNGOLOGIC PATHOLOGY. DR. JOSEPH C. BECK.

I wish to call attention to the value and the importance of the study of the fundamental branches, to be evidenced in the work as it will be presented here tonight. In regard to the group who are presenting work, I feel that I should say that the announcement that this is a "symposium on the pathology of the ear, nose and throat" should not be taken literally. This presentation is to show the value of group study such as Dr. Novak has carried out for three years. The group studying pathology is new this year, and it was suggested—I think prematurely—that they should present their work. They had only a short time to prepare the work, but I think that some excellent examples of the results of group study will be shown.

I have been interested in group study, particularly of the literature. It has proved to be successful in Chicago, where five groups meet once a month. The group study Dr. Novak has undertaken here should be going on in other cities as well.

Group study is an excellent thing in groups of six or eight, in which the discussion can be informal, easy and advantageous. In large societies, such as this,

many men have things they wish to talk about, but because it is time consuming they hesitate, and many questions are never brought out. In group study, however, it is possible to bring out such discussion. I think group study is valuable in other fundamental branches as well as in pathology. I hope that each year this society may have one evening when the fundamentals, such as embryology, anatomy and histology, may be presented. The advantage of going from microscope to microscope and discussing, not always agreeing and at times vigorously disagreeing, brings out the facts, and that is what physicians are after in scientific work. In order that groups may be formed in different parts of the country for the study of pathology, there has been formed a parent organization of pathologists of the United States and Canada, the otolaryngologists being represented by men from different institutions of learning. A meeting will be held in Kansas City in connection with the meeting of the American Medical Association.

THE HISTOPATHOLOGY OF ATROPHIC RHINITIS. DR. NOAH D. FABRICANT (by invitation).

The story which microscopic study tells concerning atrophic rhinitis is both brief and pointed. For the sake of convenience the histopathologic changes observed in atrophic rhinitis may be divided into two stages: early changes, characterized by a chronic inflammatory process, and late changes, characterized by thickening and fibrosis of the arterial walls.

The chronic inflammatory process in atrophic rhinitis creates a pronounced loss of the columnar epithelial cells, in conjunction with apparent degeneration, clumping and actual loss of cilia. The epithelium, furthermore, at isolated foci frequently undergoes early stratification and a characteristic squamous cell type of metaplasia. There is little basement membrane, and even this shows a small amount of round cell infiltration. The glands and connective tissue structures likewise undergo infiltration with lymphocytes. The arteries and veins are normal. Clinically, the pathologic picture of atrophic rhinitis is more readily recognizable than is the histopathologic picture of early atrophic rhinitis. The latter, particularly, evinces under the microscope phenomena which are frequently confused with those of any chronic suppurative process. Consequently, a clinical diagnosis can be made often at an earlier stage than that at which it can be established from a microscopic study.

The late and terminal stages are best exemplified by a degenerated, lost and noninfiltrated type of epithelium. A considerable portion of the epithelium is of the squamous cell type. Subepithelially, a dense, fibrous, scarlike tissue presents itself. Essentially all the arteries show an important diagnostic feature, namely, thickening and fibrosis. Although virtually all the German investigators negate the existence of endarteritis obliterans while one American, Ruskin, enthusiastically points out an overwhelming preponderance of the status endarteritis obliterans, my own feeling is that the truth lies somewhere between. Endarteritis obliterans, as characterized by a projection of buds of fibrous tissue from the intima and media of the arteries into the lumens of the vessels, occurs definitely, but neither as infrequently as the German investigators would have it nor as frequently as Ruskin declares.

The bone undergoes fibrosis and resorption; the nerve structures undergo fibrous and degenerative changes, and the glands are degenerated and replaced by undifferentiated fibrous tissue.

HISTOLOGY OF NASAL AND SINUS MUCOSA. DR. MAURICE F. SNITMAN (by invitation).

Histologic examination of the mucosa of the nose and of the accessory sinuses reveals a structure which is essentially similar throughout in that it consists of a surface epithelium resting on a basement membrane and a stroma, or tunica propria, the latter being intimately related to the underlying structures. Detailed variations, however, are found in these layers which are more or less characteristic of the different areas of the nasal passages.

The epithelium of the mucosa of the septum, like that of the rest of the nasal mucosa, is composed of two layers—an outer layer of pseudostratified ciliated columnar cells resting on a distinct layer of low basal cells. These basal cells are probably the vestigial remains of the basal cells of the olfactory area, which is a highly developed structure in most of the lower vertebrates. As a result of prolonged physical trauma the exposed portions of the septum are covered by stratified squamous epithelium. A basement membrane is distinct, this structure being most likely derived from the underlying connective tissue, since it is collagenous and varies in thickness, being especially thickened in chronic infection. The tunica propria is a network of fibro-elastic connective tissue, which at the attachment to the underlying bone or cartilage is condensed and acts either as periosteum or as perichondrium. Embedded in the stroma are large numbers of mucous and serous glands, and in the region of the tubercle large lakes of blood or cavernous spaces are present. Infiltration with lymphocytes is marked, distinct lymph nodules being formed in some places. At the junction of the cartilage and the bone the fibers of the stroma interlace with fibers from the opposite side.

In a similar manner the pseudostratified ciliated epithelium over the middle turbinate is replaced frequently by a low cuboidal or squamous type at the anterior tip. The stroma is rich in glands, especially over the posterior tip, and like most of the glands of the nasal mucosa they are of a tubulo-alveolar character. The periosteum is firmly attached to the underlying bone.

The mucosa of the inferior turbinate possesses an epithelium which is similar to that of the middle turbinate. The basement membrane is usually distinct, and the stroma is characterized by a large number of blood lakes. This is not erectile tissue, since septums containing smooth muscle are absent. Glands are also present but not to the same extent as in the middle turbinate.

The mucosa of a normal maxillary sinus is thin, and the epithelium is continuous with that of the nose and is of a pseudostratified ciliated variety containing numerous goblet cells. Basal cells form a distinct layer, lying on the basement membrane and interposed between the basal ends of the columnar ciliated cells.

The stroma of the maxillary antrum is poorly cellular, and the glands are scattered, being most numerous in the region of the ostium.

The mucosa of the frontal, sphenoid and ethmoid sinuses resembles that of the maxillary sinus. The epithelium of the ethmoid sinus is rich in goblet cells. The characteristic feature of all sinus mucosa is the thin stroma.

The receptors for the olfactory senses are located in the olfactory epithelium. It occupies a bilateral area of the mucous membrane in the upper part of the nasal cavity.

The olfactory area extends from the middle part of the roof of the nasal cavity from 8 to 10 mm. downward on the septum and on the surface of the upper nasal concha. The total surface of the areas of both sides is estimated at about 500 sq. mm.

The olfactory epithelium belongs to the pseudostratified columnar type, and unlike the epithelium of the respiratory area it has no distinct basement membrane. It consists of three kinds of cells: (1) sustenacular, or supporting, cells, (2) basal cells and (3) olfactory cells. The olfactory cells lie between the supporting cells. Their nuclei are spherical and form the so-called zone of round nuclei which lies at a deeper level than the nuclei of the supporting cells which form the zone of oval nuclei. The layer of basal cells is composed of irregularly branched elements lying between deep ends of the layers of supporting and olfactory cells and the underlying stroma. It is a single layer of cells and forms a modified basement membrane. The supporting cells possess on their surface a cuticle, through the holes of which the hairs of the olfactory cells project. A characteristic feature of the olfactory epithelium is the clear zone of cytoplasm lying between the external surface of the epithelium and the layer of oval nuclei. The stroma is fairly thick, possessing in its depths many cavernous spaces. The characteristic features of the stroma are the bundles of nerve tissue and the glands of Bowman.

THE NASAL POLYPS. DR. SYLVIO A. SCIARRETTA.

The true nasal polyp is the result of an inflammatory reaction of the tissue from which the mass originates. I shall describe five types of polyps and point out the cellular elements which predominate in each.

The Edematous Polyp.—The epithelium covering such a polyp varies considerably throughout the surface. It may be of the pseudostratified ciliated columnar type, columnar and either ciliated or simple, or stratified or simple squamous. These alterations are due to distention from within or to attrition. The goblet cells are few or absent and show degeneration.

The basement membrane at first is thickened, and its depth varies in the same section. Soon the elastic fibers undergo hyaline degeneration, and the outline of the membrana propria disappears, leaving the epithelial covering resting on a thin film of collagenous fibers.

The tunica propria consists of loose, irregularly arranged connective tissue with a few spindle-shaped or star-shaped fibroblasts. The intercellular substance is composed of loose collagenous tissue and some elastic fibers.

These fibers cross one another in all directions, forming large spaces filled with fluid.

Edema is the most conspicuous change. Usually it is pronounced and varies in amount. The fluid consists of an albuminous transudate containing some mucin.

The glands of the branched tubulo-areolar variety are few and are arranged in small or large groups. They lie near the surface and show atrophic changes due to pressure edema.

The blood vessels have thin walls and tend to disappear. They are few and small in the superficial regions but numerous and larger in the pedicle.

The nerve fibers are rarely visible and are difficult to demonstrate.

Areas of calcification and exostosis are present in the bone at the site of the pedicle.

The cellular infiltrations are prominent. A large number of cells collect immediately beneath the epithelial layer and around the blood vessels and glands and at times in small isolated foci. Lymphocytes, eosinophil leukocytes and plasma cells predominate; but there are some neutrophil leukocytes and mononuclear cells.

The Fibrous Polyp.—This type of polyp differs histologically from the edematous polyp as follows: The epithelial cells covering it rarely have cilia, and small areas are covered by stratified columnar epithelium, while most of its surface has stratified squamous epithelium.

The basement membrane is usually thin and dense.

The tunica propria has densely arranged collagenous and elastic fibers, with less edema and cellular infiltration. The infiltrations consist mainly of lymphocytes, neutrophil leukocytes, plasma cells and a few eosinophil leukocytes.

The glands are sparse and manifest some compression atrophy.

The few blood vessels have thick walls.

Angiectatic Polyp.—The presence of many blood vessels with a distinct cellular wall and of dilated venous sinuses differentiates this type of polyp. The tunica propria is so highly vascular as to suggest angioma.

The Glandular Polyp.—Such a polyp has many groups of glands throughout the tunica propria.

The glands located near to the basement membrane are increased in number and size, and their lumens are filled with secretion.

The epithelial cells of the ducts and the acini become larger and are arranged in many layers. Goblet cells may be numerous.

The glands located more toward the center appear to undergo some degeneration.

The secretory cells lose their outline, and masses of cast-off protoplasm are present in the lumen intermingled with the secretion.

Cystic Polyp.—Histologically this type of polyp is produced by an advanced stage of degeneration of the glandular polyp.

The secreting epithelial cells of the acini disintegrate either by the external pressure exerted on the glands by the edema in the surrounding tissue or from within by the obstruction of the ducts. Thus, the secretion accumulates in the alveolus and distends it into a large cavity lined with flat epithelial cells. The cystic content is serous fluid, purulent secretion, degenerated epithelium, fatty detritus or hyalin or calcified deposits.

The pathologic changes of the last two types, the glandular and the cystic polyp, are frequently seen in the same polyp.

It is obvious that a number of combinations of the described inflammatory changes are often found in a single polyp.

This presentation was illustrated by the microprojection of five slides demonstrating the characteristic changes found in each typical polyp.

THE HISTOLOGY OF THE TONGUE. DR. RICHARD A. PERRITT (by invitation).

The tongue is composed mainly of striated muscle fibers supported by connective tissue and covered by mucous membrane. The connective tissue which supports the muscle fibers and separates them into bundles contains mucous glands and fat. The submucosa is not well developed, the stroma of the mucosa resting directly on the underlying muscle. The mucosa has a roughened appearance because it is studded with numerous papillae.

Three forms of papillae are distinguished:

Filiform papillae are the most numerous; they are arranged in distinct rows diverging to the right and to the left and parallel to the V-shaped gustatory area. Each filiform papilla consists of a central core of connective tissue made up of elastic fibers, which are long and slender and covered by stratified squamous epithelium. When digestion is disturbed, the normal shedding of the hornified squamous cells is delayed and they accumulate in layers mixed with bacteria on the surface of the tongue. This is called the coated tongue.

Fungiform papillae are scattered irregularly over the entire dorsum among the filiform papillae. Their summits are rounded instead of pointed, and their bases are narrowed. They resemble small mushrooms.

Circumvallate papillae are so named because they are surrounded by a sort of trench. There are from 9 to 15 in man, arranged in two lines which diverge forward from the foramen caecum.

Foliate papillae are only rudimentary in man. They are paired and are found on the lateral surface of the posterior part of the tongue.

On the average there are 250 taste buds to a single papilla. In addition to those found on the tongue, there are those found on the posterior surface of the glottis and the posterior wall of the pharynx down to the level of the cricoid cartilage.

The taste buds have the form of a flask with a wide bottom. They stand upright in the epithelial layer and extend almost through its whole thickness, from the basement membrane to the surface.

There are two types of cell—sustenacular and the neuro-epithelial taste cell.

BLEEDING TUMORS OF THE NOSE. DR. MAURICE H. COTTLE (by invitation).

Dr. Cottle presented a series of colored photomicrographs of benign and malignant tumors of the nose which may cause bleeding. Low power, high power and oil immersion magnifications were shown. Included was a group of specimens of carcinoma, illustrating several varieties of anaplasia occurring in this type of lesion. Rhinoscleroma and epulis were included in the group of benign tumors.

MIXED TUMOR OF THE PAROTID GLAND. DR. JOHN W. WALL (by invitation).

Dr. Wall briefly discussed and demonstrated with microscopic slides, the normal histologic structure of the parotid gland and the pathologic picture of the mixed tumor, including its malignant transformation and metastases.

Each slide demonstrated one of the outstanding characteristics, there being seven slides in all.

REMOVAL OF TISSUE FROM THE EAR, NOSE AND THROAT AT AUTOPSY. DR. H. S. GREEN (by invitation).

Every method for the removal of tissue from the nose and sinuses and from the auditory apparatus at autopsy requires the removal of the calvarium and the brain and the exposure of the base of the skull.

The methods are as follows:

1. Nasal cavities and accessory sinuses.
   (*a*) Removal with mallet and chisel of the base of the skull lying over this area.
   (*b*) Harke's method, splitting the base of the skull into halves laterally.
   (*c*) Removal of the central portion of the base of the skull with a chain saw.
   (*d*) The core drill method of Rhea and Dunn.
2. Auditory apparatus.
   (*a*) Exposure of the middle ear by removing the tegmen tympani.
   (*b*) Removal of the petrous pyramid with a mallet and chisel.
   (*c*) Removal of the petrous pyramid together with that portion of the skull lateral to it.
   (*d*) Politzer's method, removal of the auditory apparatus and the nasal and sinus structures in one mass.
3. Organs of the neck.

The skin and superficial structures are freed anteriorly and laterally. The trachea and esophagus are freed in all directions from the thoracic inlet to the base of the skull. The floor of the mouth is separated from the inner surface of the mandible; the tongue is brought down; the soft palate is freed from the hard palate; all structures situated laterally are separated from their attachments, and the mass is removed.

The method of Lignać consists of the removal of the entire air and food passages and the organs of hearing in one mass. The organs of the neck and the floor of the mouth are freed and brought up through connecting saw cuts in the base of the skull, posterior to the petrous pyramids. The auditory and nasal structures are separated by saw cuts, and the mass is removed in toto.

DISCUSSION

DR. FRANCIS L. LEDERER: I believe that all those present feel grateful to Dr. Novak and his study group for this presentation. The program requires no apology, for it has more than filled the bill. Ordinarily one would not expect a large attendance for a program on pathology, but the large attendance tonight testifies to the willingness of the men in and around Chicago to participate in this type of fundamental work. One may rightfully feel that the group study of otolaryngologic pathology in Chicago is destined to be an excellent influence if Dr. Novak's work goes on with the same enthusiasm that initiated it. This evening's program perhaps demonstrates the group method of study better than anything else could, except that it is more formal than the usual program, being devoid of the constructive criticism that usually passes back and forth. Scientific discussion cannot be indulged in tonight because of the limited time, but this type of study offers the best postgraduate course that can be given, a worthy influence in the field of otolaryngology and an aid to younger men in the field. These men are not merely training themselves in pathology, but they are assisting one another in the study. Gratitude is due Dr. Novak for getting the ball rolling, and I hope that his enthusiasm may continue to influence this fundamental study.

DR. AUSTIN A. HAYDEN.—I wish to endorse what Dr. Lederer has said and to congratulate the officers on the arrangement of the program. A large number of presentations have been made of most interesting pathologic study and excellent photographic material, and everything has gone off splendidly. Not one of the essayists read a note, and that is rare in a medical meeting.

While I do not wish to detract any credit from Dr. Novak, for he deserves every bit that has been given, I wish to say a word for another man. The impetus for this work in Chicago was given by Dr. Joseph C. Beck.

Dr. T. C. Galloway: I was much interested in the slides illustrating the change from a benign into a malignant condition in the mixed tumor. Is one single cell the parent of all the cancer cells, or is there a general or local condition that causes metaplasia of the cells as a group?

Dr. Frank J. Novak, Jr.: In regard to the comment that none of the speakers used notes, it was decided that while the presentation would perhaps be more coherent and smoother if the remarks were written out and read, a free, more or less extemporaneous, presentation would be better.

Concerning the mixed tumor and its transformation into a malignant growth. I believe that no one is capable of answering that question adequately. Until the time arrives when it is possible by cytologic study to determine the moment at which a normal cell transforms itself into a malignant one, until more is known in general of what characterizes a malignant cell and until one can determine sharply the beginning of a malignant process in a cell, I believe that there will be no answer to Dr. Galloway's question.

AMERICAN LARYNGOLOGICAL ASSOCIATION

Fifty-Eighth Annual Congress, Detroit, May 25, 26 and 27, 1936

Burt R. Shurley, M.D., *President*

Charles J. Imperatori, M.D., *Editor of Abstracts*

(*Concluded from p. 268*)

Special Session Held at the University Hospital, Ann Arbor, Mich.

A Clinical and Pathologic Study of Tumors and Cysts of Teratologic Origin. Dr. A. C. Furstenberg, Ann Arbor, Mich.

The occurrence of tumors and cysts of teratologic origin in various organs of the body as the result of congenital disturbances of development or misplacement of embryonal cells exemplifies a few of the mysterious principles in the genesis of neoplastic growth. In one instance one may deal with a tumor which develops from a mass of tissue misplaced during the development of the embryo; in another, the neoplasm is more logically explained as a proliferation of aberrant cell collections. Both formations give rise to an extensive group of heterologous tumors varying from simple cysts to larger, more complex teratoid growths which may contain a collection of widely differentiated cells from many organs of the body.

Many notable neoplasms of this nature have been observed in the nose, pharynx, mouth and neck. Whether they arise from embryonal rests, aberrant structures or superfluous collection of cells, their precise origin and the influences which initiate and encourage their growth do not often yield to scientific explanation. Why, for example, may a mixed salivary gland tumor arise within the ethmoidal labyrinth and develop to proportions which destroy life? What influences are at work to produce a cartilaginous growth in some part of the body where normally cartilage is not found? What are the factors giving rise to the complex teratoma of the neck containing muscle, cartilage, bone, teeth, hair and a large variety of connective tissue cells? Theories to account for these pathologic changes are numerous. They are chiefly speculative and usually devoid of scientific proof. They ultimately give recognition to the hypothesis which in a broad sense ascribes the derivation of the teratoma in many cases to some disturbance or irregularity of the mechanics of embryonic development.

I felt that there was need for classification and for correlation of information on these tumors and cysts, and I have therefore made a classification of them into, first, those due to disturbances of the single, individual embryo and, second, those due to disturbances of the twin embryo.

As disturbances of the first classification one has, first, dentitional disturbances; second, branchiogenic disturbances; third, those involving the craniopharyngeal duct; fourth, irregularities of the thyroglossal duct, and, finally, neurogenic disturbances. Then there are those which involve the twin embryo.

A great variety of cysts are found in the floor of the mouth, and it is difficult to classify them. Some of them involve the submaxillary glands; others, the mucous glands in the mucous membrane of the floor of the mouth; still others are derived from some irregularity in the closure of the second branchial cleft. For all these cysts the term "ranula" is used. Some of them, however, are acquired; that is, some of them are due to closure of the ducts of mucous glands. Others are due to disturbance in closure of the second branchial cleft. The true ranula is apparently such an abnormality, one which originates in a disturbance of closure of the second branchial cleft.

A second group of teratologic origin is that of the lingual goiter, that is, aberrant thyroid tissue. Such tissue may be found anywhere from the dorsum of the tongue down to the clavicle. Cases have been reported in which thyroid tissue was found in the cervical region. There are instances of thyroid tissue found in the larynx. I observed a case in this clinic in which thyroid tissue completely obstructed the lumen of the larynx.

I think there is one precaution to observe, namely, that of leaving a portion of this tissue at the time of operation, since it may be the only thyroid tissue in the body. There are a few cases on record in which all of this thyroid tissue was removed, and subsequently myxedema developed.

Still another class is the interesting one of tumors involving the deep peripheral nerves. Many names have been given to these tumors. They have been called "perineurial fibroblastoma" and "perineurial fibroma," "solitary neurofibroma," "peripheral glioma"—and recently in the literature one has heard much about this lesion under the term "schwannoma."

This brings me to an interesting class of lesions, those derived from the brain, and they are definitely teratologic, that is, they are due to some disturbance in the embryonic development of the patient. One may find, perhaps, two groups of lesions: In one, during development of the skull there is pinched off within the nasal cavity a part of the primitive bud, which subsequently proliferates and forms a glioma in the nose. In this hospital we have observed five cases of glioma of this type occurring in the mucous membrane of the septum or between the mucous membrane flaps of the septum. Second, there may be a dehiscence in the region of the cribriform plate with protrusion of the meninges, called meningocele, or with protrusion of both the meninges and the brain, producing meningoencephalocele.

A rare tumor occurring occasionally in the head, especially within the sinuses, is the chondroma that develops apparently from cartilaginous cells which failed to undergo ossification in the development of the embryo.

Chondrosarcoma is teratologic. It develops from cartilaginous cell rests within the bones of the head. It has been described as found in the nose, in the septum, and in various other parts of the head but is rather rare.

Another growth in this class is the chordoma. It develops from the notochord, the flexible rod of cells which forms the spinal column, that is, the basic structure about which the bodies of the vertebrae and the intervertebral disks develop. Some of the notochord may become liberated from the bodies of the vertebrae or from the intervertebral disks and lie free in the surrounding tissues to proliferate later in life, producing the chordoma.

There is a group of tumors called "mixed salivary gland tumors." The site for one of these may be found in any part of the head and even in the neck. They are most interesting because of their vicious clinical manifestations.

The large embryoma demonstrates a disturbance of the twin embryo. This is a type of neoplasm affecting two or more layers of the body. It is expressly prone to occur where the germinal layers of the embryo are in close apposition. It is especially prone to occur in the pharynx and in the neck. It is teratologic and contains a profusion of connective tissue elements from the different germinal layers of the body.

FAMILY SUSCEPTIBILITY TO CANCER. DR. I. J. HAUSER and DR. C. V. WELLER, Ann Arbor, Mich.

Much has been said and is being said and written about the etiology of cancer.

One group maintains that carcinoma is the result of a loss of equilibrium of the tissues. They claim that as a result of certain changes in the tissues, which they cannot explain, certain elements begin to grow, leading to carcinoma. This theory does not tell one anything. All its proponents say is that there is a loss of equilibrium, which sounds nice, but it does not give one any information about the etiology of the disease.

There are those who believe that carcinoma is the result of chemical changes in the tissue. One cannot go very far with this because very little is known about the chemistry of tissues and even still less about the chemistry of neoplasms.

In the last century Cohnheim advanced the theory that carcinoma results when latent embryonic cells assume growth later in life. He maintained that during embryonic life certain cells, blastomeres, become detached from tissues with which they were destined to develop, and remain in a latent, quiescent stage, and that after a lapse of twenty-five or fifty years, when other tissues have reached their full growth, these detached blastomeres suddenly begin to grow and give rise to carcinoma. He maintained that every carcinoma is laid down in embryonic life in this fashion.

Then there is the factor of irritation, trauma, to the body. I think probably a carcinoma has never been seen on the external surface of the body but that the patient has been able to describe some form of trauma, some form of injury at the site preceding the recognition of the neoplasm, and yet if one looks at the matter just a little more sanely one cannot help but feel that this is merely coincidence.

On the other hand, in some neoplasms trauma plays a very definite part. It has been the experience of all on many occasions to see a carcinoma of the mouth where an ill-fitting dental plate undoubtedly initiated the lesion. In the laboratory animals which are susceptible to neoplasms carcinoma can be produced almost at will by resorting to some form of irritation or trauma.

Lastly, let me say a few words about heredity. I think all here are agreed that carcinoma is not inherited, although there still are people who maintain that that is possible. On the other hand, the question of whether or not there is an inheritance of disposition, an inheritance of susceptibility to cancer, is certainly one that can be argued for many, many hours.

If one wants to take Broder's classification one can go to the last two factors, the intrinsic or inheritable factor and the extrinsic or environmental factor. The intrinsic factor implies an inheritance of predisposition to cancer, implies the inheritance of something in the body that enables cancer to develop. The extrinsic factor implies something which initiates the growth of the cancer, heat, cold, light, trauma, irritation, any of the factors that initiate the growth of the neoplasm.

It is our opinion that both the intrinsic and the extrinsic factor are essential to the development of a malignant neoplasm. If the intrinsic factor is present in large and excessive amounts little of the extrinsic factor is needed to initiate the growth of a neoplasm. Conversely, if the intrinsic factor is present in minimal amounts a large amount of the extrinsic factor is demanded in order for a neoplasm to develop.

On the other hand, if any one is entirely lacking in the intrinsic factor, in the factor which predisposes to cancer, that person, we believe, is incapable of having carcinoma.

In 1913 the late Dr. Alfred Scott Warthin, then director of pathology at the University of Michigan, described in the literature a cancerous family composed of forty-eight persons, descendants of a cancerous grandfather. Of the forty-eight persons, fifteen presented malignant neoplasms, and two, benign neoplasms. Twelve years later, in 1925, Dr. Warthin again reported on this family, then having records of 146 members. Eighty-eight had reached adult life, and twenty-eight of these had carcinoma.

Today we wish to present this family as we now know it, composed of 305 members, 174 of whom have reached the cancer age. Since cancer is known to have occurred in members of this family at as early an age as 25 years we have arbitrarily set 25 years as the beginning of the cancer age.

In this group of 174 members forty-one have malignant neoplasms, and in two of these there are two primary malignant neoplasms, giving an incidence of carcinoma of about 2 per cent.

We do not wish to be so rash as to say that we have shown irrefutably that there is an inherited predisposition to cancer. We think if all the evidence is weighed, that is, the large number of cases in one family and the trueness to form as far as the susceptibility of organs is concerned, and if we were to superimpose on this the mendelian chart, which we have done but which would take too much time to do here, there would be found a definite trend along mendelian lines. If one weighs all these factors one cannot help but feel that chance alone could not have determined the large incidence of cancer in this family.

Factors Producing Dehydration in the Patient Who Has Been Operated on.

Dr. F. A. Coller, Ann Arbor, Mich.

All who are doing surgical work, no matter in what part of the body, are thoroughly convinced of the value of fluids to patients who have been operated on.

Some years ago my colleagues and I were impressed by the fact that we did not know how much fluid to give patients. Perhaps we were giving too much; perhaps not enough. The ordinary healthy person takes care of his water balance by responding to hunger and thirst. The amount of fluid he drinks varies tremendously. If he is working hard he loses water, more water, and he drinks more. If he is in a hot environment he drinks more, and if he is in a cold environment he drinks less. He takes water in through the food. That is the water content of the food. In addition, the fats, proteins and carbohydrates of the food furnish a certain amount of water in the course of oxidation. By and large, 90 per cent of all the food taken contains water. This does not concern us when we give water to patients who cannot ingest water because of disease or some lesion such as carcinoma of the esophagus. Therefore, we must govern the intake of fluids.

We lose water in three ways: in the urine, in the stool and as vapor from the body surfaces. At least half a liter of water must be lost in the urine per day to carry off the ordinary wastes. If the kidney has lost concentrating power, if a patient has nephritis, he is unable to discharge the waste with this amount of water and consequently must have more.

The water of the stool is not important unless the patient has severe diarrhea. Pediatricians have long taught how important are the losses of water in diarrheic disorders of infants and children; that is, the patient with cholera may die not of the disease but because of the enormous losses of water from the gastro-intestinal tract.

The matter of water vapor was new to me when we began our studies. One loses water from the surface of the body as part of the mechanism of maintaining the body at the normal temperature. At ordinary room temperature, say 70 F., one loses by radiation about 75 per cent of one's heat, which is constantly being produced. This is called "insensible loss," a term devised in the sixteenth century by Sanctorius.

As the temperature of the environment rises from 70 to 80 F. one can lose less heat by radiation and must lose more heat by evaporation; consequently one

begins to perspire. If the environmental temperature finally reaches 98.6 F., exactly that at which the body is trying to maintain itself, all the heat of the body will be lost by evaporation.

The amount of fluid that is lost varies. A normal person lying quietly in bed twenty-four hours loses from 1 to 15 liters of water. This is not sweating; sweating comes on if the amount lost goes above this. Therefore, the normal person loses about that much as part of the process of keeping the body at the normal temperature. As one moves into a higher atmosphere various other factors increase this loss.

These facts simply show that this balance is maintained very accurately. The body takes fluid for this purpose and takes fluids to balance losses from the gastro-intestinal tract. First, if there is any water left, it goes to the kidneys. This has an important bearing later because anuria can be produced easily by depriving a person of water.

A study was made of dehydrated patients. Can patients be dehydrated in the wards? They can, because we have had it happen a good many times.

Our next study was to find out how much fluid a patient loses before he appears dehydrated. If we knew, it would be perfectly simple to put that amount of fluid back into the patient. The study was carried out as follows: A healthy medical student was the subject. We first found the facts about his blood and so on. He went about his business but stopped drinking water. We let him take food which carried half a liter of water a day. On the fourth day he could not swallow and could not spit. We then allowed him about half a liter of water. He lost weight, and of course, loss of weight represents a loss of water. He was a perfectly healthy person, walking about, going to classes, but refraining from taking water. He began to have nitrogen retention, and the nonprotein nitrogen in the blood rose. On giving him all the water he wanted we observed his weight go back to normal.

We have found a quotient to aid us in maintaining water balance in the patient whose balance is normal. We have found that the patient who is dehydrated will need 6 per cent of the body weight in water to bring this up.

What are the means of doing this? There are three commonly used in this hospital: physiologic solution of sodium chloride, Ringer's solution with potassium chloride and calcium chloride added, and 5 per cent dextrose solution. Every one has his own opinion about this.

First, if a patient needs water he might just as well be given dextrose. If one gives him dextrose one should give him a concentrated solution unless one wants to remove water from his brain. The ordinary patient had best be given a 5 per cent solution of dextrose, we believe, because this is isotonic, and he will not burn any more. Every solution that one gives should have in it 5 per cent dextrose. If, in addition to that, he needs only plain water he should be given this as 5 per cent dextrose in water. If he needs chlorides he should be given 5 per cent dextrose in Ringer's solution or in solution of sodium chloride.

What patients need sodium chloride? (The speaker shows a chart.) The patients represented here were all seriously sick, with lesions. We gave fluids intravenously on these days; the amounts can be seen here, between three and four. We gave physiologic solution of sodium chloride. The patients gained weight. They should have lost weight because the caloric requirements were greater than could be replaced by giving dextrose; therefore, water was being held some place. Every one has seen edema develop in patients after the use of sodium chloride, because the patients are getting more chloride than they need; the chlorides cannot get out because there is not enough water to carry them out; therefore, the patients gain weight.

A dehydrated patient is best given Ringer's solution or physiologic solution of sodium chloride in dextrose solution, because it is good for him. It will take care of his ketosis. From then on, if he is not losing any water from his gastro-intestinal tract he does not need anything but water, and he should be given it as 5 per cent solution of dextrose.

Otolaryngologic Symptoms as Expressions of Neurosis. Dr. R. R. Dieterle, Ann Arbor, Mich.

In the newly founded psychotherapy department at the University of Michigan 2,200 persons have been examined psychiatrically. Sixty-five per cent of these fell within the group with neuroses. Many of this group showed "organ neuroses" with symptoms such as vomiting or paralysis, which are expressive of neurotic mechanisms. The location of such manifestations is a passing one, other organs being from time to time affected, and different specialists being consulted therefor. In otology diagnosis of neurosis per exclusionem is fairly frequent. There are hysterical deafness, anosmia, loss of taste and other complaints, such as choking sensations, globus hystericus, constriction of the throat, cough and burning sensations. Good judgment and common sense advice aid in the simple case; psychotherapy, in others. There is need for a more united attitude on the part of members of the professions of medicine and psychiatry toward the solution of the many problems of constitutional medicine.

Abscess of the Lung. Dr. J. L. Alexander, Ann Arbor, Mich.

I shall direct most of my remarks to the treatment of abscess. The diagnosis, I think, has become more and more obvious since the introduction of iodized poppy-seed oil 40 per cent. The history is rather characteristic. If one has a doubt as to the presence of bronchiectasis one has iodized poppy-seed oil as a means of ruling that out or in as a complicating factor.

Tuberculosis, the other common disease of the lung which might be confused with abscess, especially if there is a cavity, can be ruled out in the end by the persisting absence of tubercle bacilli from the sputum. I know of few diseases in the chest or elsewhere that require more individualistic treatment than abscess of the lung, and there are perhaps not many in the treatment of which less individualism is practiced. So often the physician says that he will put the patient to bed for a standard period of eight weeks, and that if the patient gets well or very much better he will drain the abscess surgically. If he does that in a large number of cases the mortality will be high.

With more prompt diagnosis of suppurative pneumonitis, the precursor of abscess, one learns more about the abortive treatment of abscess, particularly of abscess that in the last stage must be treated by external drainage. Through the greater use of the bronchoscope it is coming to be recognized that in many of the patients there is a stage in which the mucosa is greatly swollen and in which drainage from the suppurative area, nonabscessed as yet, is not adequate, and that if the patient is treated by shrinkage of the mucosa with equal parts of cocaine and epinephrine drainage will be established before infection digs in and destroys the lung with formation of abscesses. The coughing and expectoration following the withdrawal of the bronchoscope aid very much.

Postural drainage and repeated bronchoscopy are of advantage in obtaining relief.

When the lesion is unilateral, temporary interruption of the phrenic nerve on the affected side is of distinct value.

I feel that pneumothorax in the presence of abscess or in any nontuberculous suppuration of the lung (there are a few exceptions which I shall not go into) is very dangerous.

Drainage through the wall of the chest should not be delayed, and, while in most cases one waits eight weeks after the onset of symptoms before operating, one must judge each case separately.

Directory of Otolaryngologic Societies *

FOREIGN

COLLEGIUM OTO-RHINO-LARYNGOLOGICUM AMICITIÆ SACRUM

President: Prof. Gunnar Holmgren, Karolinska Mediko-Kirurgiska Institutet, Stockholm, Sweden.
Secretary: Prof. Dr. C. E. Benjamins, Verlengde Heereweg, 143 Groningen, The Netherlands.

NATIONAL

AMERICAN MEDICAL ASSOCIATION, SCIENTIFIC ASSEMBLY, SECTION ON LARYNGOLOGY, OTOLOGY AND RHINOLOGY

Chairman: Dr. Robert F. Ridpath, 1737 Chestnut St., Philadelphia.
Secretary: Dr. Gordon B. New, Mayo Clinic, Rochester, Minn.
Place: Atlantic City, N. J. Time: June 7-11, 1937.

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

President: Dr. Wells P. Eagleton, 15 Lombardy St., Newark, N. J.
President-Elect: Dr. Frank E. Burch, 408 Peter St., St. Paul.
Executive Secretary: Dr. William P. Wherry, 1500 Medical Arts Bldg., Omaha.
Place: New York. Time: Sept. 26-Oct. 3, 1936.

AMERICAN BRONCHOSCOPIC SOCIETY

President: Dr. Joseph C. Beck, 185 N. Wabash Ave., Chicago.
Secretary: Dr. Lyman Richards, 319 Longwood Ave., Boston.

AMERICAN LARYNGOLOGICAL ASSOCIATION

President: Dr. W. B. Chamberlain, 10515 Carnegie Ave., Cleveland.
Secretary: Dr. James A. Babbitt, 1912 Spruce St., Philadelphia.

AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY, INC.

President: Dr. George M. Coates, 1721 Pine St., Philadelphia.
Secretary: Dr. C. Stewart Nash, 708 Medical Arts Bldg., Rochester, N. Y.
Place: Atlantic City, N. J. Time: May 1937.

SECTIONS:

Eastern.—Chairman: Dr. D. C. Jarvis, Quarry Bank Bldg., Barre, Vt.
Southern.—Chairman: Dr. Charles D. Blassingame, P. & S. Bldg., Memphis, Tenn.
Middle.—Chairman: Dr. Alfred Lewy, 25 E. Washington St., Chicago.
Mid-Western: Dr. Frederick A. Figi, 1013 First St., S.W., Rochester, Minn.
Western.—Chairman: Dr. David R. Higbee, 3245 Fourth St., San Diego, Calif.

AMERICAN OTOLOGICAL SOCIETY

President: Dr. Edmund Prince Fowler, 140 E. 54th St., New York.
Secretary: Dr. Thomas J. Harris, 104 E. 40th St., New York.

* Secretaries of societies are requested to furnish the information necessary to keep this list up to date.